Memo for Major Cook:

Here is a carbon copy of the document on a recognition authentication device.

Note par. (3) thereof.

Please let me know if the recommendation action therein was justified.

[Signature]

[Note]: I feel that the subject is more of a lesser deal as that time does not appear to be much use for this. It seems that he doesn't believe further is necessary at most while. Set timers aside but one expert until model. Other replies were received but not too encouraging.
MEMORANDUM FOR: Colonel Minckler

Herewith is preliminary write-up with rough drawings of the recognition-authentication device concerning which I told you yesterday.

Recommend (1) that we be permitted to start at once to build a first model in our shop. Materials for same are practically all on hand, except for clock mechanism.

(2) that Lieut. Rosen be sent to see clock manufacturers, with a view to finding a clock suitable for the purpose of the proposed new device.

(3) that copy of these papers be forwarded to Signal Corps Patents Board for processing.

William F. Friedman.
Preliminary description of an invention concerning a mechanism for producing secret recognition, identification, or authentication symbols.

A. This description consists of this sheet of explanation and four figures. The following elements are incorporated in the device:

1. Three or more rotors, conventionally wired, and arranged with associated lamps, bar key and battery as shown in the circuit details diagram, Fig. 1.
2. A clockwork mechanism so arranged as to drive one of the rotors periodically at specified time intervals. Thus in diagram of "step mechanism details", Fig. 2, is shown a form of drive suitable for rotating rotor in number 2 position forward at specified time intervals by means of a clockwork, camshaft, cam and associated pawl. The clockwork is also provided with a conventional dial (preferably of the 24 hour variety). This dial is further subdivided into 26 segments, marked alphabetically as shown in the general view, Fig. 3.
3. Both the left and right end stator wirings are variable, and can be changed by means of a plug and jack arrangement.
4. A ring so constructed that it will fit on the outside of any one of the rotors is provided. Details of this ring are shown in the figure showing rotor details, Fig. 4.

B. Operation of the machine is accomplished in this way. (all settings according to key):

1. The ring referred to in 4 above is placed on the rotor which will be placed in position 2, the arm on the ring falling into the appropriate stepping notch in the rotor.
2. The end stator wirings are fixed.
3. Rotors are inserted.
4. The clock is wound and set to the correct time.
5. Center rotor is set to letter corresponding to that shown by clock on its alphabetical dial. (Letter visible through the cover window on rotor in #2 position is actually the letter on the removeable ring rather than the true rotor letter.)
6. Set other rotors and end plate to hourly setting.
7. Challenge is letter showing through the cover window of rotor in number 2 position.
8. Answer is letter (or letters) shown by lights when key bar is depressed.
9. If challenge letter does not correspond to letter shown in cover window of rotor in number 2 position, this rotor is reset manually before challenge is answered.
10. Rotors are reset manually on the hour. Delayed setting can be made by checking with alphabetical dial on clock. At beginning of setting period new setting is shown by the fact that the challenge is a letter at the beginning of the alphabet. (Rotor in number 2 position will not move from Z to A automatically.) Therefore if challenge is received as a letter near the beginning of the alphabet, it is known that the new setting is in effect. (This provision is for the purpose of eliminating possible errors due to slight differences in clock speeds and thus system does not require accurate synchronization.)

Disclosed to us at Washington, D.C., on November 1941.

[Signature]

Invented at Washington, D.C., November 3, 1941, by

[Signature]
A. This description consists of this sheet of explanation and four figures. The following elements are incorporated in the device:

1. Three or more rotors, conventionally wired, and arranged with associated lamps, bar key and battery as shown in the circuit details diagram, Fig. 1.

2. A clockwork mechanism so arranged as to drive one of the rotors periodically at specified time intervals. Thus diagram of "step mechanism details" (Fig. 2) shows a form of drive suitable for rotating rotor in number 2 position forward at specified time intervals by means of a clockwork, camshaft, cam and associated pawls. The clockwork is also provided with a conventional dial (preferably of the 24 hour variety). This dial is further subdivided into 26 segments, marked alphabetically as shown in the general view, Fig. 3.

3. Both the left and right end stator wirings are variable, and can be changed by means of a plug and jack arrangement.

4. A ring is provided so constructed that it will on the outside of any one of the rotors. Details of this ring are shown in figure showing rotor details, Fig. 4.

B. Operation of the machine is accomplished in this way (all according to key):

1. The ring referred to in 4 above is placed on the rotor which will be placed in position 2, the arm on the ring falling into the appropriate stepping notch in the rotor.

2. The end stator wirings are fixed.

3. Rotors are inserted.

4. The clock is set to the correct time and wound.

5. Center rotor is set to letter corresponding to that shown by clock on its alphabetical dial. (Clock rotor letter visible through the cover window is actually the letter on the removable ring rather than the true rotor letter.)

6. Set other rotors and end plate to hourly setting.

7. Challenge is letter showing through the cover window of rotor in number 2 position. (or letter)

8. Answer is letter shown by lights when key bar is depressed.

9. XXXXXX If challenge does not correspond to letter shown in cover window of rotor in number 2 position, this rotor is reset manually.

10. Rotors are reset manually on the hour. Delayed setting can be made by checking with alphabetical dial on clock. At end of setting period, new setting is shown by the fact that the challenge is at the end of the alphabet. (Rotor in number 2 position will not move from Z to A automatically). Therefore if challenge is received as a letter near the beginning of the alphabet, it is known that the new setting is in effect. (This provision is for the purpose of eliminating the possible error due to slight differences in clock speeds and thus system does not require accurate synchronization.)

Disclosed to us at Washington, D.C., on Nov. 3, 1941. Inventor, Washington, D.C., Nov. 3, 1941, by William F. Friedman

Leo Rosen
Rotors in #1, #2, and #3 positions and end plate may be rotated by hand, only rotor in #2 position is rotated by mechanical means.

Invented at Washington, D.C., November 3, 1941, by
William F. Friedman

Fig. 1

Revised to us at Washington, D.C.,
November 3, 1941:

Green S. Bank
1020 5 Burton St, Arlington, VA

Vernon E. Cooley
1402 11th, Arlington, VA

Leo Rosen
Position #2 - Mechanism Detail

Depression of Limit Stop - Lowered by Key Bar 30°-TH so that Paul will not engage Rotor Notches when Key Bar is Down

Cam on shaft turned by wound spring (or motor through friction clutch) released for one revolution at specified time intervals by clockwork. [Motor in #2 position is caused to rotate one step at specified time intervals by this mechanism.]

Invented at Washington, D.C. November 3, 1941, by

William F. Friedman

Leo Rosen
Fig. 3

Clock with additional alphabetic dial
Clock winding key flush in side
(Clock also releases cam which drives rotor in U2 position)

Hinge
Open cover to change rotors

Bar key

Declassified as Washington, D.C.,
November 3, 1941.

By

William F. Friedman
Leo Rosen

120 S. Burley St.,
Washington, D.C.

Vernon E. Coohey
204 Washington H.
Bellingham, WA.
Memo for Capt. Cook:

Be possible usage - distribution of the proposal recognition - authentication device, it appears to me that such a mechanism would be highly useful for the following purposes:

1. Identification - recognition between friendly:
   (a) Aircraft in flight in night operations
   (b) Aircraft and ground stations of anti-aircraft installations at night
   (c) Tanks and other armored vehicles in night operations
   (d) Ships and shore batteries
   (e) Ships at sea in night operations

2. Authentication of messages between friendly and semi-friendly:
   (a) Fixed radio telegraph installations of the larger headquarters (Division and above)
   (b) Ships at sea
   (c) Ships and shore stations