Sept. 17, 1946. W. C. WASHCOE 2,407,695

ROTOR

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FIGURE 1.

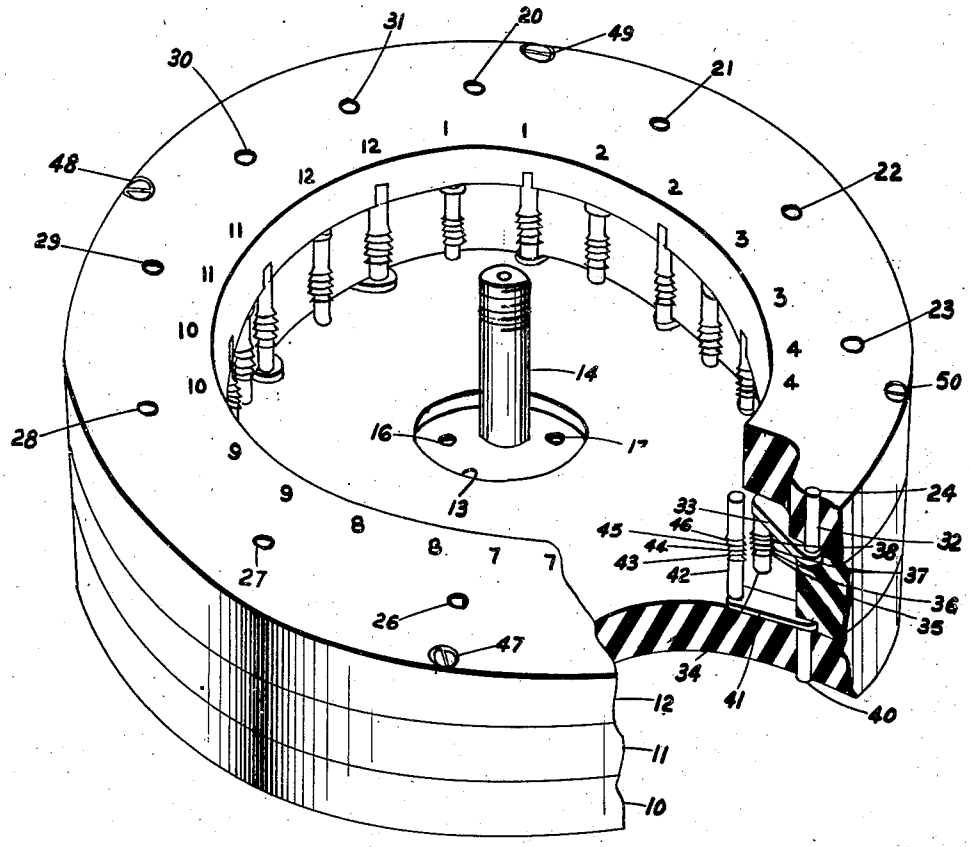
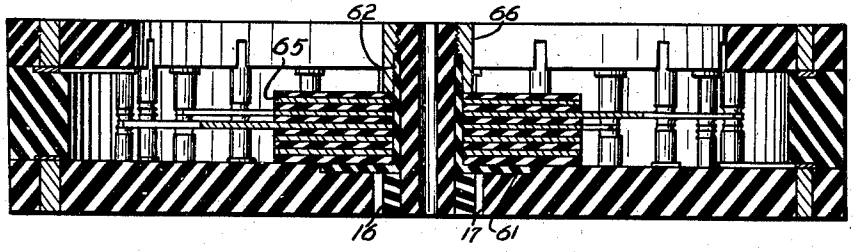


FIGURE 3.



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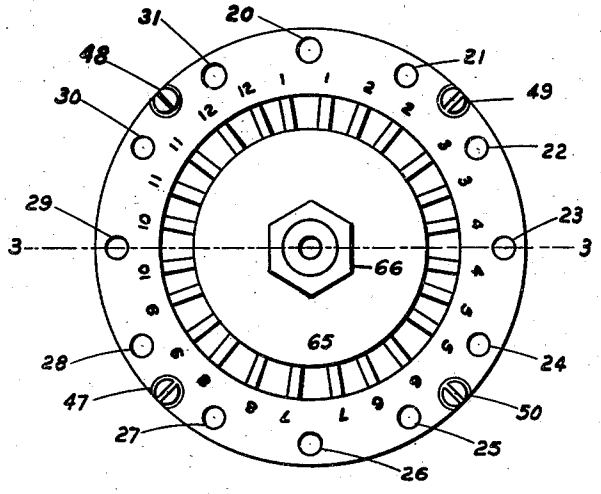


FIGURE 2

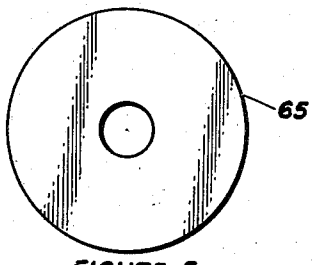


FIGURE 5

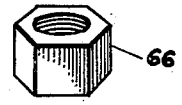


FIGURE 6

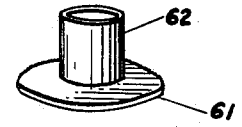


FIGURE 4

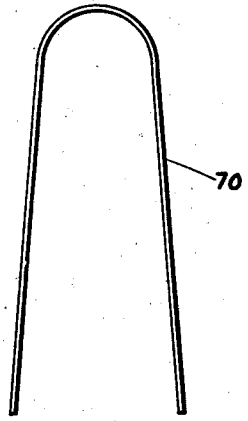


FIGURE 9

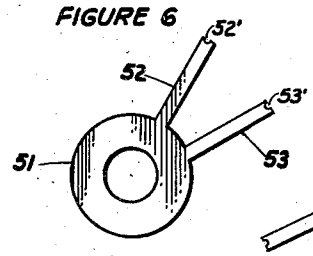


FIGURE 7

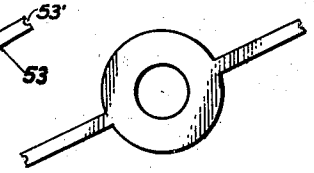


FIGURE 8

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ROTOR

Wilfred C. Washcoe, Arlington County, Va.

Application August 24, 1944, Serial No. 551,053

6 Claims. (Cl. 173—328)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment of any royalty thereon.

This invention is in cryptographic devices, and particularly, is a rotor having novel means for varying the connections between its input and output contacts.

Broadly speaking, cryptographic rotors are old, and their functions are well understood. It is sufficient here to say that they are used to mix or scramble electrical signals representing portions of a text to be enciphered or encoded. Thus, such a rotor might have on one face thereof twenty-six input contacts, each representing a letter of the normal English alphabet, and on its opposite face twenty-six output contacts. Connections between the input and the output contacts are arranged either in random fashion or according to some desired rule, so that an input signal representing, for example, the letter A will produce an output signal representing the letter K.

It is an object of this invention to provide means for varying the connections between the input and the output contacts of a cryptographic rotor quickly and easily.

Another object is to provide between the rotor contacts positive connections that can be easily made and readily changed.

An additional object is to provide a system of contact connections whereby the circuits can be changed individually or, if desired, all such connections can be removed in one operation.

Other objects will be apparent from a reading of the following specification and claims.

In the drawings:

Figure 1 is a perspective view of a rotor embodying my invention, the periphery of the rotor being broken at one point to illustrate more clearly the construction.

Figure 2 is a plan view of the rotor with the contact members in place.

Figure 3 is a section taken on one diameter of the rotor and illustrating the operation of the members used to connect the various input and output contacts.

Figure 4 shows a bushing utilized with the connecting means of the invention.

Figure 5 illustrates an insulating disc, such as is used between the several contact connecting members.

Figure 6 shows a nut used in assembling rotors of this invention.

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Figures 7 and 8 illustrate the contact members of the invention.

Figure 9 is a device which makes possible the removal of an entire group of connecting members in one operation.

Referring to the drawings and especially to Figure 1, a cryptographic rotor may be seen, comprising a lower, substantially continuous, disc 10, a ring-like member 11, and a further ring-like member 12, the latter two members being superimposed upon the disc 10. The elements 10, 11 and 12 are made of Bakelite or some other insulating material. In the center of disc 10 may be seen a circular recess 13 having a post like member 14 extending upwardly from the center thereof, the post being threaded at 15. Openings 16 and 17 extend through the disc 10 within the recess 13.

Twelve input contacts, 20 to 31, inclusive, are shown. Obviously, any number of input contacts can be used. Each input contact consists of a pin, as 32, an arm, as 33, and a second pin, as 34. The pin 34 is provided with a series of annular recesses or grooves, as 35, 36, 37, and 38. Pin 32 is so inserted in the rotor that its upper end is substantially flush with the upper surface of ring 12, and this end forms contact 24.

Output contacts, in all respects essentially similar to the input contacts just described and including, for example, a pin 40, an arm 41, and a second pin 42, with recesses 43, 44, 45, 46, are arranged so as to provide contacts substantially flush with the other face of the rotor.

The pins 34 and 42 and the others corresponding to them are well separated so that no contact will be made between them directly.

In the form of rotor shown, screws 47, 48, 49, and 50 are used to secure together the various elements of the rotor. Obviously, other means can be provided or, in fact, the whole structure may be a molded unit.

The means for making the necessary connections between the pins in the interior of the rotor are illustrated in Figures 7 and 8. The device of Figure 7 may be seen to comprise a ring, 51, its central opening being slightly larger than the post 14, and two radial arms, 52 and 53. The outer end of arm 52 has a semi-circular recess, 52', provided therein, and in the outer end of arm 53 is arranged a similar recess, 53'. The connector of Figure 8 is similar to that just described except for a different angular relationship between the extending arms. These connectors are made of relatively thin elastic metallic material, such as phosphor bronze.

The operation of the invention can now be described, reference being had especially to Figure 3. A bushing (Figure 4) which may be seen to comprise a disc-like portion, 61, similar in size to the recess 13 in disc 10, and an upstanding bushing proper, 62, adapted to fit readily over post 14, is placed over said post. One of the connecting members (see Figures 7 and 8) is then inserted in the rotor over post 14, over sleeve 62 and down upon disc 61. Recesses 52' and 53' in the ends of the arms are fitted into the lowest of the annular grooves on two of the interior contact pins, the elasticity of the arms 52 and 53 making this possible. An insulating disc, 65 (see Figure 5), is then placed over sleeve 62. It may be desirable, as well, to place an insulating disc beneath the connecting member, as shown in Figure 3. The size of the disc is not critical, but preferably it will be nearly as large as the interior of the rotor. A second connecting member is then inserted in the same manner (but associated with different contact pins), and a second insulating disc placed on top of the same. The process is continued until all desired connections are made at which point a nut, 66 (Figure 6), is placed over post 13 and screwed down, thereby securing the various connectors and insulating discs against accidental displacement.

The connections can obviously be changed merely by reversing the process of insertion and removing and replacing the connectors one by one. On the other hand, the entire group of connectors may be removed, if desired, in one operation. Nut 66 is removed and then a U-shaped pin, 70 (see Figure 9), is inserted in the openings 16 and 17 which extend through disc 10. The pin will abut against the disc-like portion, 61, of the bushing of Figure 4, and upward pressure on the pin will force the bushing, the connectors, and the separating insulators out of the rotor.

The above description is in specific terms, and various modifications will suggest themselves. The invention is not, therefore, to be considered as limited to the exact structure shown and described; and for the true scope of the invention, reference should be had to the following claims.

I claim:

1. In a device of the character described, a body member comprising a substantially continuous plate member with a recess in one face thereof having openings therein through said plate member and an axial extension from said recess, a peripheral wall for said plate member extending in the same direction as said axial extension, a plurality of input contacts having portions extending interiorly of said wall, a plurality of output contacts having portions extending interiorly of said wall, a bushing or the like having a disc like portion normally fitted within said recess in the plate member and a bushing proper normally fitted over said axial extension, a connecting member comprising a ring positioned over the axial extension and two radial arms spring pressed into engagement with two of said interiorly extending contact portions.

2. The combination of claim 1, further characterized by recesses in the interiorly extending portions of said input and output contacts.

3. The combination of claim 1, further characterized by a plurality of annular grooves in each of the interiorly extending portions of said input and output contacts.

4. In a device of the character described, a rotor proper having an axis of rotation and a hollow interior, a plurality of input contacts including exterior portions located on one face of said rotor adjacent the periphery thereof and interiorly extending members, a like number of output contacts with exterior portions located on the other face of said rotor adjacent the periphery thereof and interiorly extending members, a like number of connecting members each comprising a central portion and two radial arms spring pressed into engagement with two interiorly extending members, one of said last mentioned members being associated with an input contact and one with an output contact, insulating members interposed between said connecting members, means for securing the connecting members and the insulating members within the rotor proper, and a plurality of openings communicating between the exterior of said rotor and the interior thereof said openings being substantially symmetrical about the axis thereof.

5. In a cryptographic rotor, a body of insulation, a plurality of input contacts mounted in said body, a plurality of output contacts mounted in said body, a center post located axially of said body, a bushing for said post, said bushing having a flange at one end thereof adapted to seat upon said body, a plurality of openings through said body arranged substantially symmetrically about said post and within the limits of said flange, and thin resilient conductors each sprung between said bushing and one of said input contacts and one of said output contacts so as to connect said contacts electrically.

6. In a cryptographic rotor, a body of insulation, a plurality of input contacts mounted in said body, a plurality of output contacts mounted in said body, a central post mounted in said body and extending axially with respect thereto, a bushing for said post, flat spring connectors bridging between one of said input contacts and one of said output contacts and embracing said bushing, insulators separating said connectors from each other, and a plurality of openings through said body communicating with said bushing.

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