RFEF: A363367

Keyboard with buttons associated with each lamp in signal panel. Depression of one button as with lamp it's lamp & another are lighted.

As an authentication device - sets up a series of auth symbols

Combination of crypts & authentication device

Means for stepping on - fingerprints, paws, devices.
Condensed Progress Reports (My. Murray) Sec 13
2781-A

Security, Measures in Handling Mail
F 3086

Rail Car Number 3976
Salt 9023 8074
Case RE141-ID: A363367

design - other

Inception switch to permit shunt from crypt to authentication

Stefano

Pietro

Riccardo Librandi
This invention relates to a device or machine for enciphering or as an authenticator for testing the authenticity of messages and deciphering communications which are to be transmitted secretly in coded or cryptographic form.

The object of this invention is to provide a cipher device which is simple in construction and maintenance, but nevertheless affords a high degree of security, is light and readily portable, and can be readily disassembled and rearranged to vary the code or rendered or destroyed to prevent its use by unauthorized persons.

Another object of this invention is to provide an authenticator or means for assuring that a message which is to be decoded has originated at an authorized source and is authentic.

Other objects of the invention will become apparent as this description proceeds.

In the drawings,

Fig. 1 is a top or plan view with the covers closed.

Fig. 1a is a side elevation of the front portion of the device with the keyboard cover folded back beneath the same.

Fig. 2 is a top or plan view on an enlarged scale with the keyboard cover and parts of the rotor cover omitted.

Fig. 3 is a side elevation with the covers closed.

Fig. 4 is a cross section on line 4-4 of Fig. 2 with the rotor cover omitted.

Fig. 5 is a perspective view of the rotor latch.

Fig. 6 is a perspective view of the rotor actuating mechanism.

Fig. 7 is a diagram showing schematically the electric circuits and the mechanical operating mechanisms.

Fig. 8 is a view of a portion of the cryptograph of my invention illustrating a modified keyboard and switching means.

Fig. 9 is a view of a rotor such as is used in the device of this invention.
That embodiment of the invention selected from among others for illustration in the drawings and description in the specification is as follows. Referring to Fig. 7, the device will be seen, in general, to consist of a source 10 of electricity, shown as a pair of dry-cells, connected to a pair of wires 11 and 12 across which are connected a plurality (in this instance, twenty-six) indicators 13A, 13B, 13C, etc. These indicators are illustrated as being electric lamps arranged beneath a keyboard and indicator panel 14 (see Fig. 2) and each arranged to illuminate one perforation closed by a transparent cover 15 bearing one letter 16 of the alphabet thereon. Panel 14 is secured in place over a gasket 14' of soft rubber or the like. Across lines 11 and 12 are also connected manually operable switches 17A, 17B, 17C, etc., each arranged for operation by a pushbutton 18 projecting in proximity to the covers 15.

Connected to each of the indicators 13A, 13B, etc., is a multicontact electric switch, generally indicated as 19. It comprises a number of relatively turnable cryptographic rotors, 19A, 19C, 19D, each having a plurality of contacts therein, and 19B, each having a plurality of contacts therein, and 19D, which may be referred to as the selecting rotor, 19A, each being a stationery contact 20, each being a stationery contact, and each being a stationery contact. These connections are rearranged each time one of the rotors is turned.

In lead wires 11 is connected a normally-closed electric switch 21. Between one of the indicators, in this case 13B, and multicontact switch 19 there is a normally-closed electric switch 22. In parallel with wire 11 is wire 11A containing an authenticating switch 23 having an operating handle 24. Wire 11A also contains a normally-open switch 25.
Turning now to Figs. 1, 2, and 3 for a disclosure of the mechanical features of the invention, the device is shown as enclosed in a casing 26 to which are hinged or otherwise attached a front cover 27 and a keyboard cover 28. The keyboard-cover is secured to casing 26 by means of a double hinge 28', 28". This arrangement permits the cover to fit snugly upon gasket 14', thereby to provide a substantially dust-proof and water-proof closure for the keyboard 14. The cover may also lie flat in front of the machine, or may be folded therebeneath in the position of Fig. 3. The back part of the casing adjacent the rotor is provided with a lip 26' (see Figure 2). Cover 27 is adapted to fit over this lip, and has a gasket 27' which provides, upon closure of the rotor-cover, a dust-proof and moisture-proof seal.

In the top of casing 26 there is an opening 29 through the top by means of which a counter 30 is visible. As is most readily seen in Fig. 6, casing 26 has two projecting walls 26A and 26B. The cryptographic perforating assembly 19 is retained between these walls by mechanism which will now be described. Wall 26A has a hole in it through which may be pushed pin 30A having a knurled head 31 and a latch 32 co-operating with a retaining spring 33. Also pivoted on wall 26A is a spring latch 34 of U-shape, being bent parallel to itself. The free end 34A of latch 34 is perforated to allow pin 30A to pass through it and bears cam surfaces 35 thereon. Stationary cam 36 has a surface complementary to cam surfaces 35 so that when latch 34 is moved from the substantially horizontal position, in which it is shown in Figs. 2, 4, and 6, into the vertical position, in which it is shown in Fig. 5, the free end 34A of latch 34 is moved away from wall 26A and compresses the spring contacts (see Fig. 7) of rotors 19 and locates the rotors themselves in desired positions.

CONFIDENTIAL

CONFIDENTIAL
The manually operated means for rotating the cryptographic rotors 19 will next be referred to. As seen in Figs. 1, 2, 3, and 6, casing 26 has a recess 37 in its top into which fits a finger-piece 38 having a sliding fit in the recess and mounted on a rod 39. Rod 39 causes U-shaped stirrup 40 to turn about its pivots in walls 26A and 26B. Stirrup 40 carries as a part cam member 41 which actuates follower 42 fast on shaft 43 of counter 30. Stirrup 40 also has a neck 44 to which spring 45 is attached and which carries cam face 46. Detent 47 is pivoted at 48 in walls 26A and 26B and is stressed by spring 49 so that cam 50 engages cam face 46. Spring detents 60 normally hold rotors 19 in their relative positions but allows movement of these rotors under the actuation of pawls 58. This permits detent teeth 51 to be moved in and out of the ratchet depressions in the surface of the rotors 19.

Stirrup 40 carries a pin 52 on which are pivoted a plurality of cam-and-pawl devices 53A, 53B, 53C, and 53D which are urged by springs 54 against cam surfaces 57 or ratchet depressions 56 (see Fig. 7) on rotors 19. Device 53A, for example, has a cam surface 55 and a pawl 58 cooperating, respectively, with cam surface 57 and ratchet recesses 56 on the rotor 19A. A tang 59 of device 53A underlies device 53B so that device 53B prevents device 53A from operating unless device 53B is also depressed.

The operation of this device is as follows: To operate the cryptographic cover 28 is opened to expose the keyboard. If, as frequently happens, limitations of space require, the cover may be folded back beneath the machine. For coding or decoding, handle 24 is located so that switch 23 is open. That push button
18 which is associated with the desired letter is depressed
and the switch controlled thereby is operated. For example
if push button 18, associated with letter E, is depressed, switch 17E is closed.

Line 11B,

are made from battery 10 through line 11, switch 21, and switch
17E, through lamp 13E, and line 12 back to source 10. This
battery 10 through line 11, switch 17E, then along
section also closes connections from switch 17E, through switch
line 20, through rotors 19, A, B, C, D and reflector 19 E along counter
22, and connections 20 or rotors 10 to lamp 13Z and through
line 12 back to source 10. Lamps 13E and 13Z are simultaneous
simultaneously lighted and thus indicate that E is to be
simultaneously effort and thus indicates that E is to be
inserted into the equivalent of
inserted into the equivalent of

For rotating the cryptographic rotors 19 and thus
varying the connections between the various pairs of lamps,
the finger-piece 38 is depressed, stirrup 40 is rotated about its
plungers 39, and the devices 53A, etc., moved. Whenever one of the
cam faces 55 encounters a depression (shown at 55D in the
figures), the corresponding cam 57, the device 40 is moved by spring 54, so
that the pawl 58 enters a ratchet depression 56 unless
prevented from doing so by the engagement of the tang 59
with the next depression. Whenever a pawl 58 enters a ratchet
depression 56, and the movement of the finger-piece 56 is
completed, the corresponding rotor 19 is moved one step. This
rearranges the connections through the rotors and connects
different pairs of lamps 13A, etc., together. Counter 30 is
moved one numeral because follower 42 is depressed by cam 41
and spring returned. Detent 47 prevents backward movement of
rotors 19 because teeth 51 enter depressions in rotors 19.
moved from the upright position of Fig. 5 to the horizontal position of Fig. 6, and pin 30 withdrawn by grasping head 31.

This allows cam 35 to enter the corresponding groove in stationary cam 36. Rotors 19 can then be lifted out and destroyed if it is desired to prevent their use by unauthorized persons. Or, if the code is to be changed, the rotors can be reinserted in the casing 26 in a different order or their connections 20 changed and the rotors then inserted in casing 26.

Pin 30 placed in position, latch 34 raised, and cover 27 closed.

Suppose you are at a device in being used to authenticate a plain-language message sent from station A to station B. Having transmitted the message, station A operates its device and finds the authenticating letter to be K, for example. The letter is transmitted to the authentication station B, operating its device finds that K is正确的. The message comes from an authorized source. Upon receipt of the authentication, the letter will be different, and so one or more of the rotors will have made progress on the operation of the piece 39.
The modification of Fig. 8 includes a viewing panel 60, similar in appearance to the viewing panel and keyboard 14 of Fig. 2. In place of the push buttons 18, however, viewing panel 60 is provided with contacts only, as 61. These contacts, as shown, consisting merely of small circular elements of all connected by a common return wire 12 to the battery 10, conducting material. With reference to Fig. 7, contacts 61 may be considered to be represented by switches 17A, 17E, etc.

In place of the push buttons 18, a stylus 62 is provided and this may be considered to be connected to conductor 11 of Fig. 7. Encipherment is accomplished by making contact between stylus 62 and a desired contact 61 on panel 60.

The above description is in specific terms, but it is to be understood that the invention is not limited to the precise structures and circuits shown and described. Instead, for the true scope of the invention, reference should be had to the appended claims.

I claim:
1. In a cryptograph having relatively rotatable electric switches, there'm, means for rotating said switches so as to vary the connections therebetween, comprising a plunger or the like arranged for manual operation, means associated with said plunger and cooperating upon depression thereof with one of said electric switches for rotating the same, means associated with said plunger and cooperating upon depression thereof with another electric switch for rotating the same after a predetermined rotation of said first mentioned switch, and a brake operable by said plunger through a lost-motion connection for preventing more than a desired rotation of any switch.

2. In a cryptograph, the combination of a source of current, a plurality of inputs, a plurality of outputs, a plurality of indicating devices each with a normally open circuit between it and an input, and a normally open circuit between it and every output, and a switch associated with each of said indicating devices and adapted when closed to complete its said first mentioned circuit and one of said second mentioned circuits.

3. The combination of claim 2, further characterized by means for varying the selection of a second mentioned circuit to be completed upon the closing of a switch.

4. The combination of claim 2, further characterized by a plurality of mixing rotors, the normally open circuit between a said indicating device and the said outputs including said rotors.
5. In a cryptographing machine, a plurality of cryptographic rotors, stationary input contacts and stationary output contacts adapted to be connected variably through said rotors, an indicator connected to each of said stationary contacts, a switch associated with each indicator, and a source of current, whereby the closing of one of said switches will close a circuit through a selected input contact and its associated indicator and an output and its indicator.

6. The invention of claim 5 further characterized by means for stepping the rotors.

7. The invention of claim 5 further characterized by a plunger or the like adapted when depressed to rotate a rotor a predetermined number of steps.

8. The combination with a cryptographing machine having a plurality of electrical inputs for the characters to be enciphered, a plurality of electrical outputs for the enciphered equivalents of said characters, a viewing panel or the like including a lamp for each character, a switch associated with each lamp and with a source of current, and a plurality of circuits each including said source, one of said switches, a lamp associated therewith, an input corresponding to the character represented by said lamp, and a lamp corresponding to the output associated with the last mentioned input, whereby the closing of one of said switches will light a lamp representing a character to be enciphered and a lamp representing the enciphered equivalent of said character.
9. In a cryptography machine, the combination of a plurality of electrical inputs for the characters to be enciphered, a plurality of electrical outputs for the enciphered equivalents of said characters, a source of current, a viewing panel or the like including a lamp for each character, an electrical contact associated with each lamp, a contacting member, and a plurality of normally open circuits each including said source, said contacting member, one of said electrical contacts, the lamp and input corresponding to the character associated with said contact, and a lamp corresponding to the output associated with the last mentioned input, whereby a contact between said contacting member and one of said contacts will light a lamp representing the enciphered equivalent of said character.

10. In a cryptography machine, a source of current, a plurality of cryptographic rotors, stationary input contacts and stationary output contacts adapted to be connected variably through said rotors, an indicator connected to each of said stationary contacts, a plunger or the like adapted when depressed to rotate a rotor a predetermined number of steps, a switch associated with each indicator, an additional normally open switch controlling a circuit between a predetermined input contact and an output contact and its indicator, and a further normally open switch adapted to be closed by said plunger thereby to energize the indicator associated with said output only if said additional normally open switch is closed.
11. In a combination with a cryptographing machine adapted to receive input signals representing characters to be enciphered and to mix the signals and to indicate to an operator both input and enciphered characters, an authenticator adapted when actuated to indicate the output character associated with a predetermined input character.

12. In combination with a cryptographing machine adapted to receive input signals representing characters to be enciphered and including a rotor for mixing the signals, means for indicating to an operator both input and enciphered characters, means for stepping the rotor, and means for recording the steps of said rotor, and an authenticator adapted when actuated to indicate only the enciphered character instantaneously associated with a predetermined input character.

13. The method of providing a certification of identity for a secret message comprising characters enciphered by a stepping rotor, which includes recording the steps of the rotor and utilizing the enciphered equivalent of a predetermined character after a predetermined number of steps of said rotor.

14. The method of authenticating a message of characters enciphered by an electrical system of stepping cryptographic rotors having an input contact and an output contact for each character which comprises providing a circuit including a predetermined input contact and an output contact dependent upon the instantaneous positions of said rotors, and utilizing the enciphered equivalent of the character associated with said predetermined input contact for known conditions of said rotors.
This invention relates to a device or
machine for enciphering and deciphering
communications which are to be transmitted
recently in coded or cryptographic form.

Among the objects of this invention are

1. to provide a cipher device which is simple
   yet affords a high degree of security, is
   light and readily portable, and can be readily
   disassembled and rearranged to vary the
code or deranged or destroyed to prevent its
use by unauthorized persons.

2. Another object of this invention is to provide
   an authenticating or means of indicating that a
   message which is received has originated from
   an authorized source.

Other objects of the invention will become
apparent as this description proceeds.
In the drawings:

Fig. 1 is a top or plan view with the covers closed.
Fig. 2 is a top or plan view on an enlarged scale with the keyboard cover and part of the rotor cover omitted.
Fig. 3 is a side elevation with the covers closed.
Fig. 4 is a cross section on line 4-4 of Fig. 2 with the rotor cover omitted.
Fig. 5 is a perspective view of the rotor latch.
Fig. 6 is a perspective view of the roller actuating mechanism.

Refer to Fig. 7.

A diagram showing the electric circuit and the mechanical operation mechanisms of the invention related thereto, among others, illustrating the drawings and describing in the specification is as follows. Referring to Fig. 7, the device will be seen in general to consist of a source 10 of electricity shown as a pair of dry cells, connected to a pair of wires 11 and 12 across which are connected a plurality (in this instance twenty-six) indicators 13A, 13B, 13C, etc. These indicators are illustrated as being electric lamps arranged beneath a keyboard 14 (see Fig. 2) and each arranged to illuminate one projection fingered by a transpar
cross 15 leaving one letter of the alphabet therem. Across lines 11 and 12 are also connected in series with one of the indicators 13 A 13 B etc. Each arranged for operation by a pushbutton 18 projecting through keyboard 14 along side of one of the covers 15. Connected to each of the indicators 13 A 13 B etc. is a multi-contact electric switch generally indicated as 19. It comprises a number of stationary terminals 19 A 19 B 19 C 19 D etc. each having a plurality of contacts thrown and connecting between the contacts as shown diagrammatically at 20. Each connection 20 leads from one station through the cryptographic stator to another stationary contact. These connections 20 are rearranged each time one of the stators is turned.

In lead wire 11 is connected a normally closed electric switch 21 between one of the stators
indicators in the case 13E, and multi-contact switch 19 is connected normally closed.

digital switch 22. In parallel with wire 11 is wire 11A containing an authenticating switch
23 having actuating handle 24. Wire 11A also contains a normally open switch 25.

Turning now to Fig. 0,1, 2 and 3 for a description of the mechanical features of the

mechanism the device is shown as enclosed in a
casing 26 to which are hinged or otherwise
attached a rear cover 27 and a keyboard
cover 18. Casing 26 has an opening through
the top by means of which a counter 30 is visible.
As is most readily seen in Fig. 6, casing 26
has two projecting wells 26A and 26B. The

cryptographic nits 19 are retained between
those wells by mechanism which will now be
described. Wall 26A has a hole in it through
which may be pushed from 30 having a knurled head 31 and a latch 32 cooperating with a
retaining spring 33, also twisted on well 26 A.

In a spring latch 34 of U-shape being bent loads parallel to itself. The free end of latch 34
is perforated to allow pin 30 to pass through it and locate cam surfaces 35 herein. Stationary
cam 36 has a surface complimentary to cam surfaces 35 so that when latch 34 is moved from
the substantially horizontal position in which it is shown in Fig. 2, 4 and 6 into the
vertical position in which it is shown in Fig. 5, the free end of latch 34 is moved away from well
shaving 26 A (see Fig. 2), and compresses the contents of vats 19, and
locates the vats 19 themselves in desired position.

The manually operated means for rotating the camographic style 19 will result in vats 19 being
as seen in Figs. 1, 3, 5 and 6, causing 26 to a

receive 37 in its top into which fits a fingers piece 38 forming a sliding fit in the receiver and
mounted on a rod 39, Rod 39 carries U-shaped

at Smith 40 to turn about its pivot in well 26A and 26B.  Trigger 40 carries as a part cam 41 which actuates follower 42 kept on shaft 43 of counter 30.  Trigger 40 also has a part 44 to which spring 45 is attached and which carries cam face 46.  Point 47 is inserted at 48 in walls 26A and 26B and is dressed by Cham 49, i.e., that cam 50 engages cam face 46.  This permits design teeth 51 to be inserted in and out of the machined depressions in the surface of the rather 19.  Trigger 40 carries a pin 52 on which are rotated a

Identical 63 and hand degree 53A, 53B, 53C, and 53D which are urged by spring 54 against cam surfaces 57, which define flanges 56 or 8 or 3 or 7) of notch 19.  Device 53A is a cam 55 and a hand 58 cooperation, respectively, with cam surface 59 and notch 50 recesses 56 on the rear 14A, a turn 59 of device 53A actuates device 53B so that device 53B prevents device 53A from operating unless device 53B is also depressed and operating.

The operation of this device is as follows.  In coding or decoding, handle 24 is located so that notch 23 is open.  The push button 18 which is associated with the desired letter is depressed and the pusher controlled thereby is depressed.  An example of a push 17E representing the letter E is closed.  Connections are made from battery 10 through line 11, contact 21 and push 17E through lead 13E and line 12.  Right answer 10.
Trigger piece 38 is then depressed, opening contacts 21 and 22 and closing switch 25.
This movement moves counter 30 one position, and also opens more notches 19 and 27. Circuit is closed from switch 10, line 11, line 11A, switch 23, switch 25, to contacts 20 to switch 13 E. Circuit 13 E, contacts 13 E is open at switch 22. This action ensures that the notches 19 are connected up in the same way and in agreement with the setting of counter 30 that the message is authentic from other words, originates at an authorized source.

To readily remove the notches 19, cover 27 is
removed, pin 38 withdrawn by grasping feed
31, and latch 34 raised from its depressed
position, 13 E to the horizontal position,
30. The arrows came 35 to enter the
corresponding groove in stationary cam 36.
Notch 19 can then be lifted out and
destroyed. It is desired to prevent their
use by unauthorized persons. On if
the code is to be changed the pins can be
reinserted in the casing 26 in a different
order of their connections 20 changed and the
notch then reinserted in casing 26, pin 30
placed in position, latch 34 raised, and cam
27 closed.
In a cryptography machine, means for ensuring the authenticity of the message transmitted, said means comprising a transforming device for transforming characters from text to cipher or the reverse, a handle connected as is to be preferable to move said device into each of its ciphering combinations and indicating one of which is actuated when each actuation of said handle, which when actuation indicate a selected character.
2. A device consisting of a source of electricity, each electric lamp having a switch attached thereto to designate one character, a multi-contact electric switch connected into a circuit between said source and said lamps and operable to connect said lamps to said source in various arrangements, and a second switch mechanically arranged so as to be closed when said multi-contact switch is operated from one position to another and separated into several sections, whereby current is closed through one lamp which gives an authenticating signal.

3. Claim 2, omitting "and" plus and a third switch connected in series with said second switch and said source as to control the connections therein.

and the other side of said source.
A B C plus
a multi-contact electric switch connected into
circuit between said source and said lamps
and operable to connect said lamps in pairs,
across said battery,
and
a normally-closed electric switch connected
on the other side of
between said source and each of said lamps
so as to control the connection therebetween and
mechanically arranged so as to be operated
when said multi-contact switch is operated
from one position to another.

5. Claim 4 omitting "and" plus - D.

6. A B C plus
manually operable switches, each connected between
the other side of said source and one of said lamps.
6. A B C - plus manually operable, normally open electric switches, each connected between the other side of said source and one of said lamps, whereby when one of said manually operable switches is closed, circuit is established through the lamp to which it is adjacent and through said multi-contact/and another of said lamps to indicate a cipher character.

E and D.

7. Claim 6, omitting "and", plus, and a normally closed electric switch connected between the other side of said source and each of said manually operable switches and mechanically arranged so as to be opened when said multi-contact switch is moved from one position to another.
8. A coding device comprising:

- a panel having a plurality of switch-operating handles projecting thereinfrom, a plurality of electric switches each associated by one of said handles, a plurality of electric lights each associated with one of said handles and each carrying character-indicating indicia therein,

- a plurality of cryptographing rotors having stationery contacts each connected to one of said lights and bridging contacts connecting said lights in pairs,

- an operator having a limit-motions connection with said rotors to move said rotors step-by-step,

- a normally-closed electric switch in series with each of said handle-operated switches and a source of current,

- a normally-open electric switch in series with said stationery contacts of said rotors and said source of current (over)
said operator acting to open and normally-
close switch and to close and normally-open
switch upon each step in the movement of said

9. Clavin & omitted "and" figure - and
a counter connected under the control of said operator
is so as to indicate the number of activations of said
operator.
Friedman claims

In a cryptographing machine

having rotating, electric, rutile, shifters wherein

means for manually rotating said shifters, as to vary the connections therebetween,

and means comprising a finger Greece arranged

by manual rotation of a postably mounted

shifter, located under the control of said

finger Greece and a plurality of cam and

ratchet devices movably mounted on said shifter,

and each stepped against a cam surface on

one of said shifters and arranged to enter one

ratchet opening on said shifter when not

actuated by said cam surface and moveable

together with said shifter to turn said shifter.

11. Omitting "and" then add:

and turns on all but one of said devices and

turns each rotator the preceding device

which on all said devices is of a critical

nature on said finger Greece and each

preceding device can be a functional

where it is permitted to do so by the cam surface

which contacts it and by all the preceding

devices.

12. In a cryptographing machine

containing a number of rotors a like for

storing said other said fitters comprising

a number of shores material requiring
12 (cont.) Initially mounted on the other end, the rod is free for longitudinal movement into and out of contact with the end rod and retro-cam surface on said free end and a stationary cam co-operating with said cam surface to move said free end when said latch is turned about its pivot.
This invention relates to a device or machine for enciphering and deciphering communications which are to be transmitted secretly in coded or cryptographic form.

Among the objects of this invention are to provide a cipher device which is simple yet affords a high degree of security, is light and readily portable, and can be readily disassembled and rearranged to vary the code or deranged or destroyed to prevent its use by unauthorized persons.

Another object of this invention is to provide an authenticator or means for indicating that a message, which is to be decoded, has originated at an authorized source.

Other objects of the invention will become apparent as this description proceeds.

In the drawings,

Fig. 1 is a top or plan view with the covers closed.

Fig. 2 is a top or plan view on an enlarged scale with the keyboard cover and parts of the rotor cover omitted.

Fig. 3 is a side elevation with the covers closed.

Fig. 4 is a cross section on line 4-4 of Fig. 2 with the rotor cover omitted.

Fig. 5 is a perspective view of the rotor latch.

Fig. 6 is a perspective view of the rotor actuating mechanism.

Fig. 7 is a diagram showing schematically the electric circuits and the mechanical operating mechanisms.
That embodiment of the invention selected from among others for illustration in the drawings and description in the specification is as follows. Referring to Fig. 7, the device will be seen, in general, to consist of a source 10 of electricity, shown as a pair of dry cells, connected to a pair of wires 11 and 12 across which are connected a plurality (in this instance, twenty-six) indicators 13A, 13B, 13C, etc. These indicators are illustrated as being electric lamps arranged beneath a keyboard 14 (see Fig. 2) and each arranged to illuminate one perforation closed by a transparent cover 15 bearing one letter 16 of the alphabet thereon. Across lines 11 and 12 are also connected manually operable switches 17A, 17B, 17C, etc., each in series with one of the indicators 13A, 13B, etc., and each arranged for operation by a pushbutton or handle 18 projecting through keyboard 14 along side of one of the covers 15.

Connected to each of the indicators 13A, 13B, etc., is a multi-contact electric switch, generally indicated as 19. It comprises a number of relatively turnable cryptographic rotors, 19A —— 19E, each having a plurality of contacts thereon and connections between pairs of the contacts as shown diagrammatically at 20. Each connection 20 leads from one stationary contact through the cryptographic rotors to another stationary contact. These connections 20 are rearranged each time one of the rotors is turned.

In lead wire 11 is connected a normally-closed electric switch 21. Between one of the indicators, in this case 13E, and multi-contact switch 19 is connected normally-closed electric switch 22. In parallel with wire 11 is wire 11A containing an authenticating switch 23 having an operating handle 24. Wire 11A also contains a normally-open switch 25.

Turning now to Figs. 1, 2 and 3 for a disclosure of the mechanical features of the invention, the device is shown as enclosed in a casing 26 to which are hinged or otherwise attached a rotor cover 27 and a keyboard cover 28. Casing 26 has an opening 29 through the top by means of which a counter
30 is visible. As is most readily seen in Fig. 6, casing 26 has two projecting walls 26A and 26B. The cryptographic rotors 19 are retained between these walls by mechanism which will now be described. Wall 26A has a hole in it through which may be pushed pin 30A having a knurled head 31 and a latch 32 co-operating with a retaining spring 33. Also pivoted on wall 26A is a spring latch 34 of U-shape being bent parallel to itself. The free end 34A of latch 34 is perforated to allow pin 30A to pass through it and bears cam surfaces 35 thereon. Stationary cam 36 has a surface complementary to cam surfaces 35 so that when latch 34 is moved from the substantially horizontal position, in which it is shown in Figs. 2, 4, and 6, into the vertical position, in which it is shown in Fig. 5, the free end 34A of latch 34 is moved away from wall 26A and compresses the spring contacts 20A (see Fig. 2) of rotors 19 and locates the rotors themselves in desired positions. The manually operated means for rotating the cryptographic rotors 19 will next be referred to. As seen in Fig. 1, 2, 3, and 6, casing 26 has a recess 37 in its top into which fits a finger piece 38 having a sliding fit in the recesses and mounted on a rod 39. Rod 39 causes U-shaped stirrup 40 to turn about its pivots in walls 26A and 26B. Stirrup 40 carries as a part cam 41 which actuates follower 42 fast on shaft 43 of counter 30. Stirrup 40 also has a part 44 to which spring 45 is attached and which carries cam face 46. Detent 47 is pivoted at 48 in walls 26A and 26B and is stressed by spring 49 so that pin 50 engages cam face 46. Spring detents 60 normally hold rotors 19 in their relative positions but allows movement of these rotors under the actuation of paws 58. This permits detent teeth 51 to be moved in and out of the ratchet depressions in the surface of the rotors 19. Stirrup 40 carries a pin 52 on which are pivoted a plurality of cam-and-pawl devices 53A, 53B, 53C, and 53D which are urged by springs 54 against cam surfaces 57 or ratchet depressions 56 (see Fig. 7) on rotors 19. Device 53A for example, has a cam surface 55 and a pawl 58 cooperating, respectively,
with cam surface 57 and ratchet recesses 56 on the rotor 19A. A tang 59 of device 53A overlies device 53B so that device 53B prevents device 53A from operating unless device 53B is also depressed and operating.

The operation of this device is as follows: For coding or decoding handle 2h is located so that switch 23 is open. That push button 18 which is associated with the desired letter is depressed and the switch controlled thereby is operated. For example if switch 17E representing the letter E is closed, connections are made from battery 10 through line 11, switch 21 and switch 17E through lamp 13E, and line 12 back to source 10. This action also closes connections from switch 17E through switch 22 and connections 20 or rotors 19 to lamp 13E and thence through line 12 back to source 10. Lamps 13E and 13Z are therefore simultaneously lighted and thus indicate that E is to be encoded or decoded as the case may be, as Z and vice versa. Since rotors 19 connect all the lamps 13A, 13U, etc., together in pairs each letter has another corresponding to it.

For rotating the cryptographic rotors 19 and thus varying the connections between the various pairs of lamps, finger-piece 38 is depressed, stirrup 40 is rotated, about its pivots and the devices 53A etc., moved. Whenever one of the cam faces 55 encounters a depression (shown at 55D in Fig. 4) in the corresponding cam 57 the device 53 is moved by spring 54 so that the pawl 58 enters the ratchet depression 56 unless prevented from doing so by the engagement of the tang 59 with the next device 53. Whenever a pawl 58 enters a ratchet depression 56, and the movement of the finger-piece 38 is completed, the corresponding rotor 19 is moved one step. This rearranges the connections 20 through the rotors and connects different pairs of lamps 13A, etc., together. Counter 30 is moved one numeral because follower 42 is depressed by cam 41 and spring returned. Detent 47 prevents backward movement of rotors 19 because teeth 51 enter depressions in rotors 19.

For insuring the authenticating of a message, switch 23 is closed by snapping handle 2h. Finger-piece 38 is then depressed, opening switches 21
and 22 and closing switch 25. This movement moves counter 30 one position and also one or more rotors 19 one step. Circuit is closed from sources 10, line 11, line 11A, switch 23, switch 25, rotor connections 20 to whichever lamp happens to be paired with lamp 135. Circuit to lamp 135 is open at switch 22. The designation letter of the lamp which is paired with 135 is transmitted as an authenticator, an agreement having been previously reached by the two parties concerned as to the wiring of the several rotors, their arrangement in the device, and the number of steps having been taken as indicated by counter 30.

To readily remove the rotors 19, cover 27 is opened, latch 34 moved from the upright position of Fig. 5 to the horizontal position of Fig. 6, and pin 30 withdrawn by grasping head 31. This allows cam 35 to enter the corresponding groove in stationary cam 36. Rotors 19 can then be lifted out and destroyed if it is desired to prevent their use by unauthorized persons. Or if the code is to be changed the rotors can be reinserted in the casing 26 in a different order or their connections 20 changed and the rotors then inserted in casing 26, pin 30 placed in position, latch 34 raised, and cover 27 closed.
1. In a cryptographing machine, means for insuring the authenticity of the message transmitted, said means comprising, a transposing device for transposing characters from text to cipher or the reverse, a finger piece connected so as to be operable to move said device into each of its ciphering combinations, and indicators, one of which is actuated upon each actuation of said finger piece, and which upon actuation, indicates a selected character.

2. In a cryptographing machine, means for insuring the authenticity of the message transmitted, said means comprising, a source of electricity, electric lamps each connected to one side of said source and each adapted, when lighted, to designate one character, a multi-contact electric switch connected into circuit between said lamps and operable to connect said lamps in various arrangements, and a second switch mechanically arranged so as to be closed when said multi-contact switch is operated from one position to another and to be connected into circuit between said multi-contact switch and the other side of said source whereby circuit is closed through one lamp which gives an authenticating signal.

3. In a cryptographing machine, means for insuring the authenticity of the message transmitted, said means comprising, a source of electricity, electric lamps each connected to one side of said source and each adapted, when lighted, to designate one character, a multi-contact electric switch connected into circuit between said lamps and operable to connect said lamps in various arrangements, a second switch mechanically arranged so as to be closed when said multi-contact switch is operated from one position to another and connected into circuit between said multi-contact switch and the other side of said source, whereby circuit is closed through one lamp, which gives an authenticating signal, and a third switch connected in series with said second switch and said source so as to control the connections therebetween.
4. In a cryptographing machine, means for insuring the authenticity of the message transmitted, said means comprising, a source of electricity, electric lamps each connected to one side of said source and each adapted, when lighted, to designate one character, a multi-contact electric switch connected into circuit between said lamps and operable to connect said lamps in various arrangements, and a normally-closed electric switch connected between the other side of said source and each of said lamps so as to control the connection therebetween and mechanically arranged so as to be opened when said multi-contact switch is operated from one position to another.

5. In a cryptographing machine, means for insuring the authenticity of the message transmitted, said means comprising, a source of electricity, electric lamps each connected to one side of said source and each adapted, when lighted, to designate one character, a multi-contact electric switch connected into circuit between said lamps and operable to connect said lamps in various arrangements, a second switch mechanically arranged so as to be closed when said multi-contact switch is operated from one position to another and connected into circuit between said multi-contact switch and the other side of said source, whereby circuit is closed through one lamp which gives an authenticating signal, a third switch connected in series with said second switch and said source so as to control the connections therebetween.

6. In a cryptographing machine, means for insuring the authenticity of the message transmitted, said means comprising, a source of electricity, electric lamps each connected to one side of said source and each adapted, when lighted, to designate one character, a multi-contact electric switch connected into circuit between said lamps and operable to connect said lamps in pairs, manually operable, normally open electric switches, each connected between the other side of said source and one of said lamps, whereby, when one of said manually operable switches is closed, circuit is established through the lamp to which it is adjacent and through said multi-contact switch and another of said lamps to indicate a cipher character, a normally-closed
electric switch connected between the other side of said source and each of said lamps so as to control the connection therebetween and mechanically arranged so as to be opened when said multi-contact switch is operated from one position to another and a second switch mechanically arranged so as to be closed when said multi-contact switch is operated from one position to another and connected into circuit between said multi-contact switch, and the other side of said source, whereby circuit is closed through one lamp, which gives an authenticating signal.

7. In a cryptography machine, means for insuring the authenticity of the message transmitted, said means comprising, a source of electricity, electric lamps each connected to one side of said source and each adapted, when lighted, to designate one character, a multi-contact electric switch connected into circuit between said lamps and operable to connect said lamps in various arrangements, manually operable, normally open electric switches, each connected between the other side of said source and one of said lamps, whereby, when one of said manually operable switches is closed, circuit is established through the lamp to which it is adjacent and through said multi-contact switch and another of said lamps to indicate a cipher character, a normally-closed electric switch connected between the other side of said source and each of said lamps so as to control the connection therebetween and mechanically arranged so as to be opened when said multi-contact switch is operated from one position to another, a second switch mechanically arranged so as to be closed when said multi-contact switch is operated from one position to another and connected into circuit between said multi-contact switch and the other side of said source, whereby circuit is closed through one lamp, which gives an authenticating signal, and a third electric switch connected on series with said second switch and said source so as to control the connection therebetween.

8. A coding device comprising, a panel having a plurality of electric-
switch-operating handles projecting therethrough, a plurality of electric switches each operated by one of said handles, a plurality of electric lights each associated with one of said handles and with a character-indicating indicia, a plurality of cryptographing rotors having stationary contacts each connected to one of said lights and having bridging contacts connecting said lights in pairs, an operator having a lost-motion connection with said rotors to move said rotors step-by-step, a source of current, a normally-closed electric switch in series with each of said handle-operated switches and said source of current, and a normally open electric switch in series with one of the stationary contacts of said rotors and said source of current, said operator acting to open said normally closed switch and to close said normally-open switch upon each step in the movement of said rotors.

9. A coding device comprising, a panel having a plurality of electric-switch-operating handles projecting therethrough, a plurality of electric switches each operated by one of said handles, a plurality of electric lights each associated with one of said handles and with a character-indicating indicia, a plurality of cryptographing rotors having stationary contacts each connected to one of said lights and bridging contacts connecting said lights in pairs, an operator having a lost-motion connection with said rotors to move said rotors step-by-step, a source of current, a normally-closed electric switch in series with each of said handle-operated switches and said source of current, a normally-open electric switch in series with one of the stationary contacts of said rotors and said source of current, said operator acting to open said normally-closed switch and to close said normally-open switch upon each step in the movement of said rotors, and a counter connected under the control of said operator so as to indicate the number of actuations of said rotors.

10. In a cryptographing machine having relatively rotary electric switches therein, means for manually rotating said switches individually so as to vary the connections therebetween, said means comprising, a finger piece arranged for
manual operation, a pivotally mounted stirrup located under the control of said finger piece, and a plurality of cam and pawl devices pivotally mounted on said stirrup and each stressed against a cam surface on one of said switches and arranged to enter one ratchet opening on said switch when not restrained by said cam surface and movable together with said stirrup to turn said switch.

11. In cryptographing machine having relatively rotary electric switches therein, means for manually rotating said switches individually so as to vary the connections therebetween, said means comprising, a finger piece arranged for manual operation, a pivotally mounted stirrup located under the control of said finger piece, a plurality of cam-and-pawl devices pivotally mounted on said stirrup and each stressed against a cam surface on one of said switches and arranged to enter one ratchet opening on said switch when not restrained by said cam surface and movable together with said stirrup to turn said switch and tangs on all but one of said devices, said tangs each overlying the preceding device whereby one of said device is operative at each actuation of said finger piece, and each successive device can become operative only when it is permitted to do so by the cam surface which controls it and by all the preceding devices.

12. In a cryptographing machine containing a number of rotors, a latch for stressing said rotors in position comprising, a U-shaped member of spring material having one end pivotally mounted and the other end free for longitudinal movement into and out of contact with the end one of said rotors, a cam surface on said free end, and a stationary cam co-operating with said cam surface to move said free end when said latch is turned about its pivot.

13. A cryptographing, coding or ciphering machine substantially as shown and described.