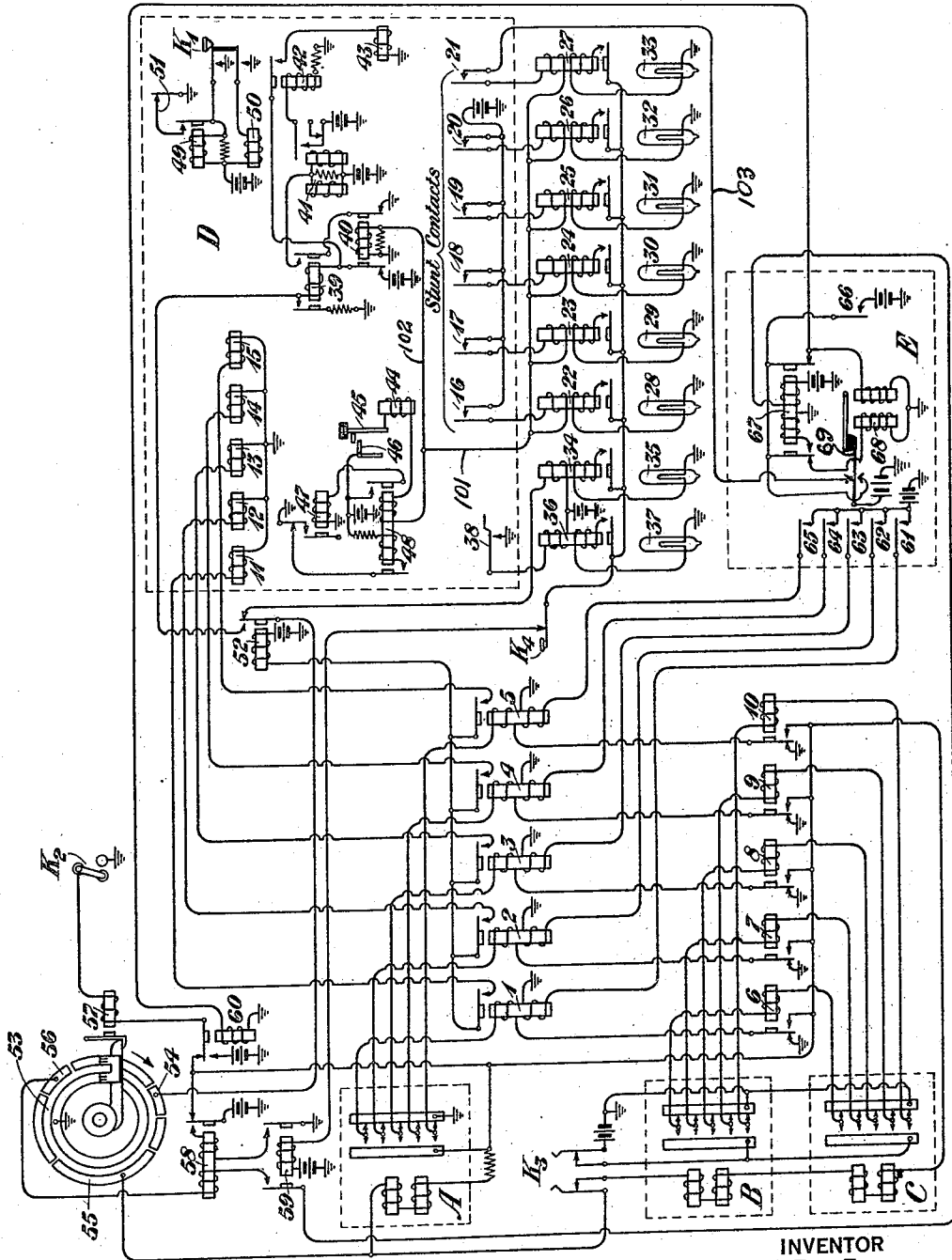


L. F. MOREHOUSE.
CIPHERING DEVICE.
APPLICATION FILED JULY 23, 1920.

1,415,106.

Patented May 9, 1922.



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CIPHERING DEVICE.

1,415,106.

Specification of Letters Patent.

Patented May 9, 1922.

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To all whom it may concern:

Be it known that I, LYMAN F. MOREHOUSE, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain Improvements in Ciphering Devices, of which the following is a specification.

This invention relates to improved printer arrangements for use with devices for enciphering and deciphering messages.

A well-known arrangement for enciphering and deciphering messages is illustrated in the U. S. Patent No. 1,320,908, issued November 4, 1919, to R. D. Parker. This arrangement utilizes printing telegraph equipment and the enciphering is accomplished by combining the code combinations of the original message with the code combinations of one or more cipher or key tapes, the resulting code combinations comprising the enciphered message. To decipher the code combinations of the enciphered message are combined at the receiving station with the code combinations of key tapes identical to those utilized at the sending station, the resulting code combinations representing the characters of the original message. The enciphered message may be recorded on a perforated tape for transmission between stations or it may be desirable to record it in printed form for transmission.

One of the well-known codes utilized with arrangements of this character is the Baudot code in which each character is represented by a combination of five "marking" or "spacing" impulses. A five-unit code of this character would have thirty-two combinations of which twenty-six would be used to designate letters of the alphabet and the remaining six would be used as "stunt" signals, i. e. to control the printer operations, such as "line feed," "carriage return," etc. In the aforementioned method of preparing cipher messages these "stunt" signals would appear at irregular intervals in the enciphered message, as the code combinations of said message are the result of combining the code combinations of the message tape with the key tapes. Accordingly, if an ordinary printer was utilized with the ciphering device to record the cipher message, the result would be a badly confused message due to the fact that these "stunt" signals would occur at other than proper times and the printer would be operated thereby at undesirable times. Accordingly, it is a general

object of this invention to provide a printer which will not confuse the message by operating in accordance with the "stunt" signals, but which will give a printed record of said signals. Other objects and features of the invention will appear more fully from the detailed description hereinafter given.

In the printer arrangements of this invention there is provided a plurality of signal lamps. Whenever a "stunt" signal appears in the enciphered message, the printer will not operate in the normal manner in accordance with the "stunt" signal, but will operate one of the signal lamps. A keyboard perforator is also provided by which the operator, whenever one of the signal lamps indicates that a certain "stunt" signal is occurring in the enciphered message, may introduce a combination of two characters into the printed record of the message to indicate the stunt signals. These two character combinations for representing the "stunt" signals are picked from an arbitrarily chosen code, which for the purposes of this invention is as follows, although other such codes might be utilized.

SA represents letter S,
SB represents line feed,
SC represents space,
SD represents carriage return,
SE represents letter shift,
SF represents figure,
SG represents blank.

The invention may be more fully understood from the following description together with the accompanying drawing in which is illustrated a preferred form of the invention. In the drawing there is illustrated the message transmitter A and the transmitters B and C for the cipher or key tapes. The code combinations of the message tape are combined with the code combinations of the two cipher tapes by means of the cipher relays 6, 7, 8, 9 and 10 and the resulting code combinations representing the characters of the enciphered message are set up on the selecting relays 1, 2, 3, 4 and 5. As this ciphering method is fully described in the aforementioned patent to R. D. Parker no further description thereof will be given. The selecting relays 1, 2, 3, 4 and 5 control the selecting magnets 11, 12, 13, 14 and 15 of a printer D. The printer D is of a type well-known in the art, which, for example, is disclosed in the Patent No.

1,215,604 granted February 13, 1917, to G. M. Yorke, and includes stunt contacts 16, 17, 18, 19, 20 and 21 which represent figures, letters, carriage return, space, line feed and the letter S respectively. These stunt contacts control the relays 22, 23, 24, 25, 26 and 27 which relays in turn control the signal lamps 28, 29, 30, 31, 32 and 33 respectively. Whenever a code combination representing a stunt signal or the letter S is set up on the selecting magnets 11, 12, 13, 14 and 15 of the printer, one of these stunt contacts will operate and light the corresponding signal lamp as will be pointed out later. The printer D also includes the usual type of printing relay 39, clear-out relay 40, release magnets 41, start relay 42 and start magnet 43. There is also provided a printing magnet 44 and type shaft 45, stop bars such as 46 and space magnet 47 and a space lock relay 48. There is also provided the carriage restore key K_1 , carriage contacts 51, the carriage return magnet 49 and the line feed magnet 50. Two additional signal lamps 37 and 35 are provided, lamp 37 being controlled by the margin relay 36 and margin contacts 38 and lamp 35 being controlled by the blank relay 34. In order to cause the printer to give a two-character printed indication of the stunt signals set up on the selecting magnets, there is provided the keyboard transmitter E which includes the selecting contacts 61, 62, 63, 64 and 65, the common keyboard contacts 66, the keyboard relay 67, the keyboard magnets 68 and the locking contacts 69. Associated with the selecting relays is the release control relay 52. The release key K_2 is also provided for controlling the stunt relay 59. The stunt relay 59 is associated with the transmitter control relay 58 which in turn is associated with a distributor 53 which is provided for timing the sequence of operation of the arrangements. Associated with the distributor is a start key K_3 and starting magnet 57 and the start control relay 60. Associated with the transmitters B and C is the cipher cut-off key K_4 which, when operated, allows the message tape to be recorded in unenciphered form.

The operation of the arrangements of the invention is as follows. The code combinations representing the characters in the two key tapes will be set up on the cipher relays 6, 7, 8, 9 and 10 and will be combined with a code combination of the message tape to set up on the selecting relays 1, 2, 3, 4 and 5, a code combination representing a character of the enciphered message. The selecting relays will set up this same code combination on the printer selecting magnets 11, 12, 13, 14 and 15 and will also operate the release control relay 52. When the starting switch K_3 is operated the distributor starting magnet 57 will operate and will release the brush arm of the distributor 53. When the brush crosses segment 54 the printing relay 39 will be operated over a circuit through the front contact of the release control relay 52. The printing relay 39 will lock itself and start the operation of the printer in the usual well-known manner. If the combination set up on the selecting magnets is not a stunt signal (or the letter S) the printer will print, space and clear out in the normal manner. When the brush crosses segment 55 the magnets of the tape transmitters A, B and C will be operated and the message and key tapes will be stepped ahead. When the brush passes off of segment 55 the tape transmitter magnets will be released thus setting up on the selecting relays 1, 2, 3, 4 and 5 and the selecting magnets 11, 12, 13, 14, and 15 the code combination representing the next character of the enciphered message. These operations will be repeated as long as the brush continues to rotate.

The operation of the circuit arrangements whenever a stunt signal or the letter S is set up on the selecting magnets will now be described. It is pointed out that in the arbitrarily chosen code for giving a two character printed indication of the stunt signals the letter S has been chosen as the first of the two letters to represent each stunt signal. Accordingly the stunt contacts 16, 17, 18, 19 and 20 in the printer including the contact 21 operated by the letter S signal, have been wired so that each stunt contact operates a self locking relay such as the relays 22, 23, 24, 25, 26 and 27, which relays in turn when operated, will light the signal lamps 28, 29, 30, 31, 32 and 33. When the brush crosses segment 54 of the distributor the printing relay 39 will be operated and this will operate the release magnets 41. When the release magnets 41 operate, the stunt contacts will close, thus operating the corresponding relay such as the one of the relays 22, 23, 24, 25, 26 and 27 in series with the clear out relay 40. The circuit for relay 40 would be as follows: from ground, winding of relay 40, conductors 102 and 101, upper winding of one of the relays, such as 22, 23, 24, 25 or 26, through one set of the stunt contacts, such as 16, 17, 18, 19 or 20, to battery and ground. The circuit for relay 40 might also be completed as follows: from ground, winding of relay 40, conductors 102 and 101, upper winding of relay 27, contacts 21, conductor 103, contact 69 to battery and ground. The clear out relay 40 will release the printing relay 39 and the release magnets 41 before the starting relay 42 and the start magnets 43 have operated to release the type shaft 45 and therefore no character will be recorded on the printer. This is due to the introduction of a time lag due to the fact that the starting relay 42 and also the start magnet 43 will be fairly slow in operating.

It would furthermore take a certain amount of time for the type shaft 45 to complete this operation. The relay which was operated by one of the stunt contacts will lock itself and

5 light its corresponding lamp such as one of the lamps 28, 29, 30, 31, 32 and 33 and this will also close a circuit for operating the stunt relay 59.

When the brush crosses segment 55 the tape transmitter magnets will be operated in the usual manner. When the brush crosses segment 56 a circuit will be closed from ground through the brush, segment 56, left-hand winding of the transmitter control relay 58, left-hand front contact of stunt relay 59 and right-hand winding of the keyboard relay 67 to battery and ground. This will operate the transmitter control relay 58 and the keyboard relay 67. The operation of the keyboard relay 67 will have no effect at this time. The transmitter control relay 58 will lock itself and disconnect battery from the distributor starting magnet 57 and also from the stepping magnets of the tape transmitters and from the left-hand bus-bar of the message transmitter A and the front contacts of the cipher relays 6, 7, 8, 9 and 10. This will release the distributor starting magnet 57 and stop the brush arm from further rotation. It will also prevent the operation of the stepping magnets of the tape transmitters and will release the selecting relays 1, 2, 3, 4 and 5 and the selecting magnets 11, 12, 13, 14 and 15.

After this occurs the operator will depress the key first in the keyboard transmitter for the letter S and will later depress the key on the keyboard transmitter for the letter indicated by the signal lamp lighted by one of the stunt contacts. When a key of the keyboard transmitter is depressed by the operator, the corresponding combination will be selected and set up on the keyboard selecting contacts 61, 62, 63, 64 and 65 and the common keyboard contacts 66 will be closed. The common keyboard contacts 66 will close a contact for operating the keyboard magnets 68. The keyboard magnets 68 will lock in the combination set up on the selecting contacts 61 to 65 inclusive and will lock itself through the locking contacts 69. The selecting contacts will set up the corresponding combination on the selecting relays 1, 2, 3, 4 and 5 and these in turn will operate the corresponding selecting magnets 11, 12, 13, 14 and 15 of the printer D. A circuit will be closed from battery through the common keyboard contacts 66 and also from battery through the locking contacts 69 and right-hand back contact of the keyboard relay 67 and through the winding of the start control relay 60 to ground. This will operate the start control relay 60, which in turn will operate the distributor starting magnet 57 and allow the brush arm of the

distributor to start rotating again. When the brush arm crosses segment 54 the printing relay 39 will be operated and this will start the operation of printing the selected letter as previously described. It is pointed out that at this time the stepping magnets of the tape transmitters will not operate when the brush crosses segment 55 as their circuits are open at the back contact of the transmitter control relay 58. When the brush crosses segment 56 a circuit will be closed through the winding of the transmitter control relay 58 and the left-hand front contact of stunt relay 59 to operate the keyboard relay 67. The keyboard relay 67 on operating will open the previously closed circuit of the start control relay 60 and will release the keyboard magnets 68.

When the operator depresses the key of the keyboard transmitter for the second of the two letters representing the stunt signal, these operations will be repeated and the printer will record the second letter.

The stunt contacts 21 which are operated by the letter S signal, are connected to battery through a back contact 69 in the keyboard. It has been previously pointed out that when a letter S signal is set up on the selecting magnets as a result of a combination of characters in the three tape transmitters, the letter S will not be recorded on the printer but the corresponding stunt signal lamp will be lighted instead. This is due to the operation of the clear-out relay 40 over the S contacts 21, over a circuit from ground and battery, contact 69, conductor 103, contacts 21, winding of relay 27, conductors 101 and 102, winding of relay 40 to ground. The clear-out relay 40 will release the printing relay 39 and the release magnets 41 before the starting relay 42 and the start magnet 43 have operated to release the type shaft 45, and therefore no character will be recorded on the printer. However, when a letter S signal is transmitted from the keyboard E, the previously traced circuit for relay 40 will be opened at contact 69, and the clear-out relay will not operate to interfere with the ordinary operation of the printer, which will accordingly print the letter S in the normal manner.

After recording the two letters representing the stunt signal, the release key K₁ is depressed by the operator. This opens the circuit for and thereby releases any one of the stunt relays 22, 23, 24, 25, 26 and 27 which have been operated and this restores the circuit to normal. The printer will then continue to record the code combinations set up on the selecting relays.

When the carriage has reached the end of a line the margin contacts 38 will be closed thereby closing a circuit through the upper winding of the margin relay 36 to battery and operating said relay. The operation of

relay 36 closes a circuit from ground, filament of the signal lamp 37, lower winding of relay 36, contact and armature of relay 36, winding of stunt relay 59, to battery, thereby operating lamp 37 and stunt relay 59. The operation of lamp 37 will inform the operator that the carriage has reached the end of the line and accordingly the operator will depress the carriage return key K_1 . This will operate the carriage return magnet 49 and the line feed magnet 50 and thereby restore the carriage and feed up the paper. The operation of relay 59 will cause relay 58 to operate when the brush of the distributor crosses segment 56. The operation of relay 58 will in the same manner as previously pointed out prevent the arrangements from operating while the operation of returning the carriage is taking place. The release key K_1 may then be operated and the signal lamp 37 extinguished and the circuit restored to normal again.

While the invention has been disclosed in certain specific arrangements which have been deemed desirable, it is understood that it is capable of embodiment in many and widely varied forms without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A plurality of selecting means upon which may be automatically set up code combinations representing message characters and "stunt" signals, a printer associated with said selecting means and adapted to give a printed indication of said message characters and a visual indication of said "stunt" signals, means operating whenever said printer gives a visual indication of said "stunt" signals for stopping the operation of said printer, and manually operable means associated with said printer for operating said printer.

2. A plurality of selecting means upon which may be set up the code combinations of message tapes, said code combinations representing message characters and "stunt" signals, a printer associated with said selecting means and adapted to give a printed indication of said message characters and a visual indication of said "stunt" signals, means operating whenever said printer gives a visual indication of said "stunt" signals for stopping the operation of said printer and for releasing said selecting means, and manually operable means associated with

said printer for operating said selecting means and starting said printer in operation.

3. A plurality of selecting relays upon which may be automatically set up code combinations representing message characters and "stunt" signals, a printer associated with said selecting relays and adapted to give a printed indication of the code combinations representing message characters, a plurality of "stunt" contacts in said printer operating whenever the code combinations represent "stunt" signals, a plurality of relays and signal lamps controlled by said "stunt" contacts, means controlled by said last mentioned relays when operated for stopping the operation of said printer and for releasing said selecting relays, and manually operable means associated with said printer for setting up code combinations on said selecting relays and operating said printer.

4. A plurality of selecting means upon which may be automatically set up code combinations representing characters of a plurality of groups, a printer associated with said selecting means and adapted to give a printed indication of the characters of one of said groups and a visual indication of the characters of another of said groups, means operating whenever said printer gives a visual indication of said characters for stopping the operation of said printer, and manually operable means associated with said printer for setting up code combinations on said selecting means and for starting said printer in operation.

5. In a ciphering device in which the code combinations of a message are combined in effect with the code combinations of a key tape and the resulting code combinations forming the ciphered message are utilized to control a printer, the method of eliminating certain signals from the printed form of the ciphered message which consists in automatically stopping the operation of said printer whenever the resulting code combination represents one of said signals, manually substituting another code combination for said resulting code combination which represents said signal, and starting said printer in operation again.

In testimony whereof, I have signed my name to this specification this 9th day of July, 1920.

LYMAN F. MOREHOUSE.