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2,840,216

AUTOMATIC LOCKING MEANS FOR KEYBOARDS

Filed Feb. 5, 1940

2 Sheets-Sheet 1

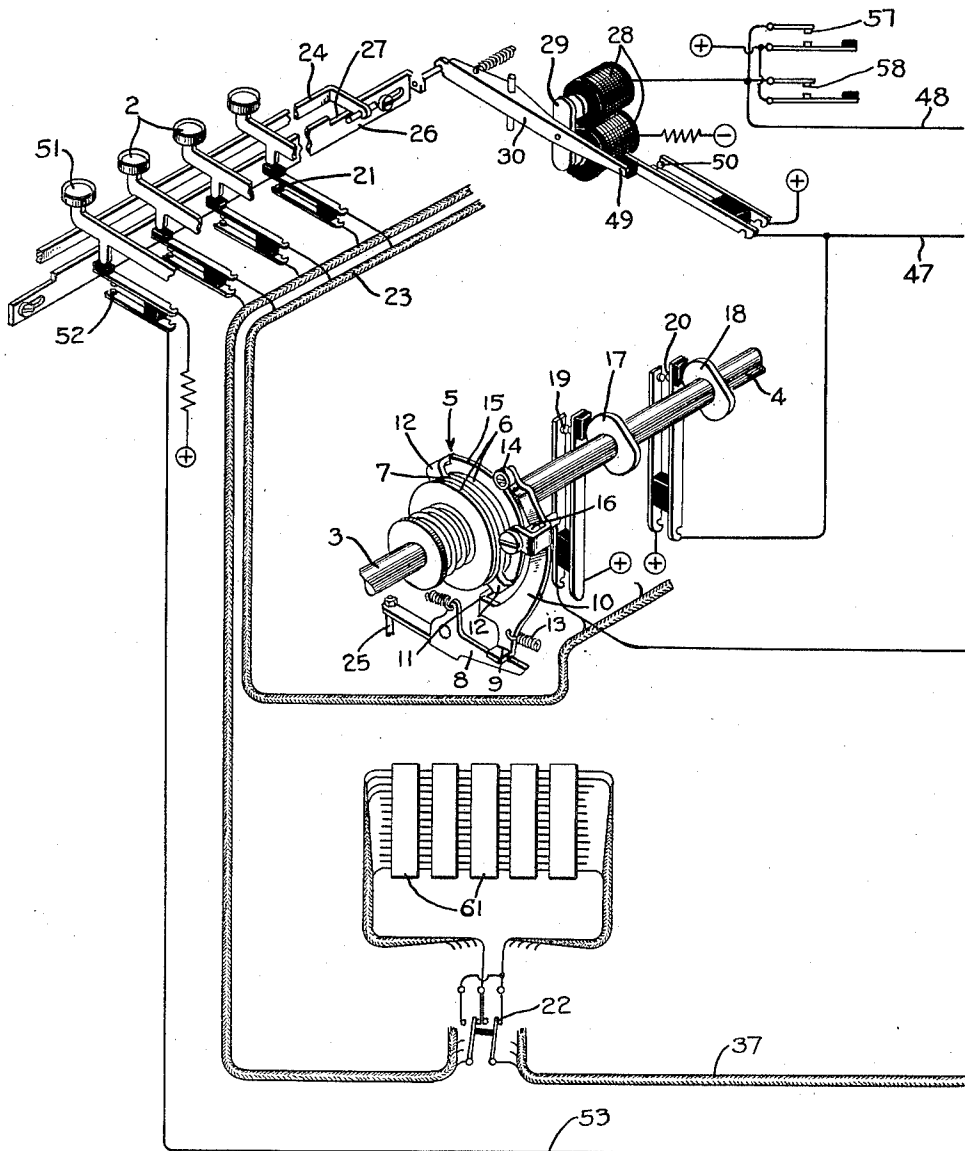


FIG. 1

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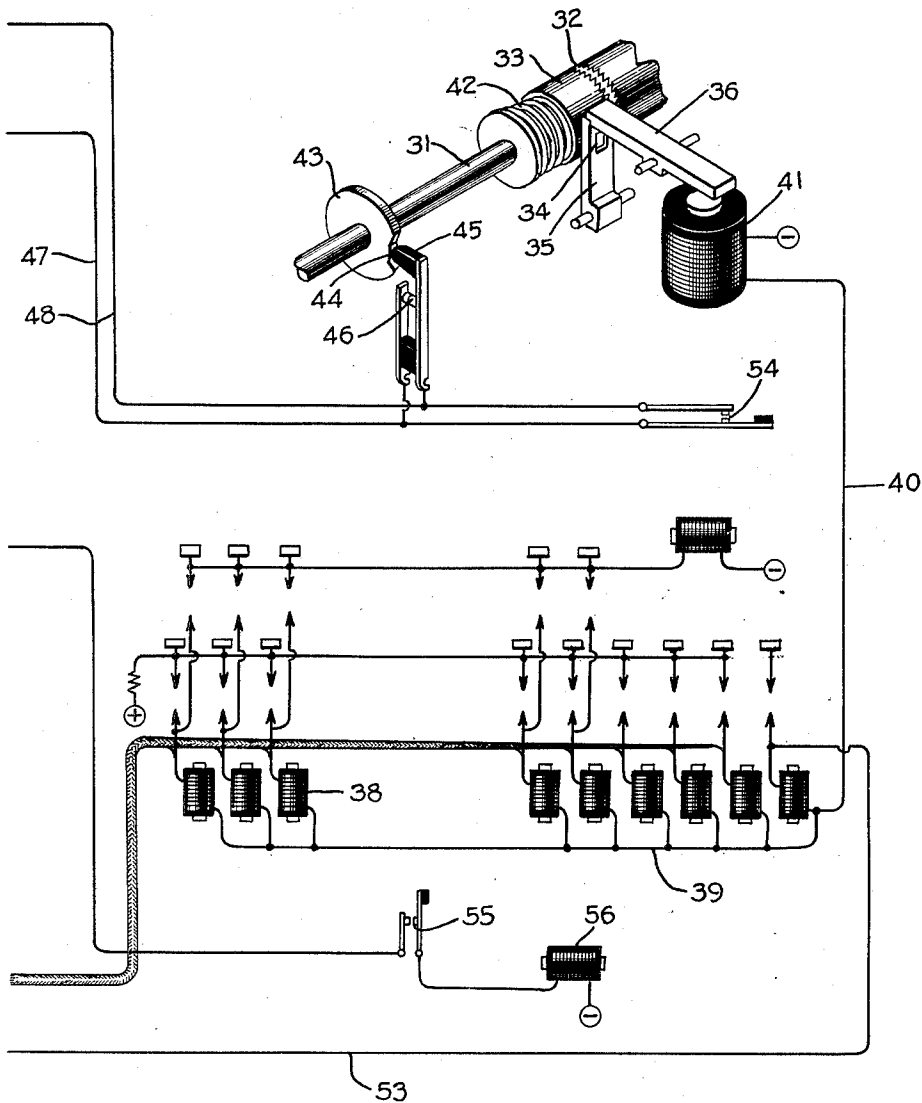


FIG. 2

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AUTOMATIC LOCKING MEANS FOR KEYBOARDS

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Application February 5, 1940, Serial No. 317,456

8 Claims. (Cl. 197—4)

This invention relates to electromechanical coding and decoding apparatus having a coding unit and a unit to record or print characters in response to operation of the coding unit, and particularly to means for preventing further operation if the printing unit fails to function.

The primary object of this invention is to prevent continued operation of the coding device when printing of characters in response to such operation is not being effected.

Other objects will become apparent from the following description when read in connection with the accompanying drawings, wherein:

Fig. 1 depicts schematically those elements of the coding unit directly concerned in the present invention;

Fig. 2 is complementary to Fig. 1 and illustrates schematically those parts of the printing unit wherein the present invention is embodied.

The subject matter of this application is intended to be incorporated in the apparatus shown and claimed as a complete assembly in the application of Larson, Levin and Thienemann, Serial No. 317,454, filed February 5, 1940, having been developed to insure that non-printing of characters should be immediately brought to the attention of the operator. This is essential since otherwise the characters in a coded message would not correspond throughout with the positions of certain elements of the mechanism and hence decipherment of the message would be impossible.

The complete system comprises a coding unit having variable random circuit mechanisms of a type well known in this art, whereby the circuits are sporadically changed, and a printing unit controlled by current transmitted through the said circuits whereby to record a character each time the coding unit is operated.

The parts of the coding unit involved in the present invention are shown schematically in Fig. 1. Shaft 3 is continuously driven by a motor (not shown) and is drivingly engageable with cam sleeve 4 by a clutch 5 of the type fully shown and described in the patent to A. H. Reiber, 2,019,505, November 5, 1935. This clutch has friction washers 6 that slide on disk 7 so long as latch 8 is engaged with lug 9 on clutch locking lever 10 which has a finger 11 engaged with a lug 12 on disk 7. However, when latch 8 is disengaged from lug 9, spring 13 frees finger 11 from lug 12 and the friction washers drive cam sleeve 4 a few degrees until a positive mechanical clutch (not shown) is engaged to provide a positive drive. Roller 14 rides up cams 15 to rock lever 10 about pivot 16 and reengage latch 8 with lug 9 after 180° of rotation of cam sleeve 4, the above-mentioned mechanical clutch being disengaged immediately before the roller 14 rides up cam 15.

Sleeve 4 carries a plurality of cams, of which cams 17 and 18 only are of present concern, and these are disposed to close contacts 19 and 20, respectively. It is to be kept in mind that the showing in Fig. 1 is schematic only and that cams 17 and 18 are actually double, to

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close contacts 19 and 20 in the course of each 180° of rotation of sleeve 4.

The character keys 2 are pivotally mounted and each key is effective to close an individual pair of contacts 21 that is in a circuit through the maze of random circuits represented at 61, the direction in which the current traverses the random circuits being reversible by a switch 22, the current passing from left to right through 61 when coding and from right to left when decoding. It will be observed that one side of each of the contacts 21 is connected through conductor 23 to one side of contacts 19 whereby the circuit is not operatively completed until cam 17 closes contacts 19. As described in the above-mentioned application of Larson, Levin and Thienemann, means are provided to hold a character key 2 depressed until the cam 17 has closed contacts 19 and the other phases of an operating cycle have been completed.

Extending under all of the character keys 2 is a universal bail 24 pivotally mounted at its ends to be rocked downwardly when a key 2 is depressed. By mechanism fully shown in the patent to Reiber, supra, the bail 24 is connected to rod 25 to release latch 8 and permit rotation of the cam sleeve 4. Underlying the ends of bail 24 is a longitudinally slidable locking blade 26 having cut out portions 27 that normally underlie the arms of bail 24 and permit the bail to operate. However, under certain conditions to be hereinafter described, the keyboard locking magnets 28 are energized and attract armature 29 to which is connected one end of pivoted lever 30 that is also connected to locking blade 26 to slide the locking blade longitudinally and move the cut out portions 27 away from bail 24 whereby to prohibit rocking of the bail and prevent depression of the keys 2. When the operator notes that the keys 2 cannot be depressed he is warned that the mechanism is locked and requires attention.

Referring now to Fig. 2, it will be seen that the printing unit includes a rotatable shaft 31 that is connectible through jaw clutch 32 with a motor (not shown). The driven jaw 33 of clutch 32 carries a camming lug 34 that engages in a camming slot in clutch throw-out lever 35 to disengage clutch 32, the lever 35 being held in clutch disengaging position by a latching lever 36. When any pair of contacts 21 is closed, and the circuit is completed by closure of contacts 20, an impulse is transmitted through conductor 37 to some one of the type bar selector magnets 38 to select a type bar for operation. The printing unit is very similar to that described in bulletin No. 109 of the Teletype Corporation, dated April 1926, except that type bars are selected for operation directly instead of code bars being selected as in the commercial printing telegraph system. However, the driving means in Fig. 2 above set forth is identical with that fully disclosed in the said bulletin No. 109. It is seen in Fig. 2 that each of the type bar selector magnets 38 is connected by conductors 39 and 40 to a clutch release magnet 41 which, when energized, rocks latching lever 36 and allows a biasing spring to move the clutch throwout lever 35 out of engagement with lug 34, thereby permitting spring 42 to engage the jaws of clutch 32 and drive shaft 31.

Fixed on shaft 31 is a cam 43 having a cut out portion 44 so disposed that the cam follower 45 drops into the cut out portion 44 when lug 34 is engaged with lever 35. When the cam follower 45 is lying in cut out portion 44 contacts 46 close a circuit through conductors 47 and 48 to contacts 20 and keyboard locking magnets 28, respectively. Since the circuit to locking magnets 28 is not completed until contacts 20 are closed, the closure of contacts 46 does not by itself lock the keyboard. When a key 2 is depressed and current flows to the selector mag-

nets 38 and to clutch release magnet 41, the jaws of clutch 32 engage and immediately cam follower 45 rides up on cam 43 to separate contacts 46 and break the circuit to locking magnets 28 before the contacts 20 are closed. However, if for any reason, the clutch 32 is not released to drive shaft 31, the circuit at contacts 46 remains closed and therefore as soon as cam 13 closes contacts 20, the magnets 28 are energized and locking blade 26 is moved to lock the keyboard.

Lever 30 has its end 49 disposed to close contacts 50 and complete a holding circuit through locking magnets 28. Keyboard locking magnets 28 may be deenergized by means of release key 51 that controls contacts 52 directly connected by conductor 53 to clutch release magnet 41. When contacts 52 are closed the clutch release magnet 41 is energized, clutch 32 is engaged and shaft 31 is rotated to break the circuit at contacts 46, all independently of the circuits controlled by the character key 2.

Certain features are indicated in the drawings that are not directly concerned with the present invention, such as contacts 54 that are closed to lock the keyboard when the end of a line is reached; contacts 55 and magnet 56 that insert an extra space after every fifth character that is recorded; contacts 57 that are closed to lock the keyboard when the switch 22 is not fully thrown to either the encipher or decipher position, and contacts 58 that are closed when the mechanism for changing the random circuits 21 is not conditioned for operation, all the above being fully set forth in the said application of Larson, Levin and Thienemann.

We claim:

1. Ciphering mechanism and printing mechanism responsive to operation of said ciphering mechanism, said ciphering mechanism including a rotatable cam sleeve, clutch means engageable to drive said sleeve, means to disengage said clutch means cyclically, a plurality of character keys each mounted on a key lever, a member operable by each of said key levers connected to release said clutch means for driving engagement with said sleeve, means to lock said member against operation, a first electromagnet to move said locking means to locking position, a pair of contacts individual to each said key disposed to be closable by the respective key lever, a first cam on said sleeve, character pulse contacts disposed to be closable by said cam and connected in series with each of said pairs of contacts, a second cam on said sleeve, lock pulse contacts closable by said second cam, said printing mechanism including a rotatable cam shaft, clutch means engageable to drive said shaft, means cyclically engageable with an element of the printing mechanism clutch means to disengage said element and retain the same latched in disengaged position, a second electromagnet disposed to release said element from latched position to effect driving of said cam shaft, means including said character pulse contacts connecting all said pairs of contacts to energize said second electromagnet each time any one of said character keys is depressed, a third cam on said shaft, a pair of locking contacts having a portion contacting said third cam whereby said contacts are opened when said shaft revolves, means connecting said lock pulse contacts and said locking contacts to energize said first electromagnet when said lock pulse contacts and said locking contacts are concurrently closed; an additional pair of contacts, means to close said additional contacts and means connecting said additional contacts and said lock pulse contacts to energize said first electromagnet when said additional contacts and said lock pulse contacts are closed concurrently.

2. Ciphering mechanism and printing mechanism responsive to operation of said ciphering mechanism, said ciphering mechanism including a rotatable cam sleeve, clutch means engageable to drive said sleeve, means to disengage said clutch means cyclically, a plurality of character keys each mounted on a key lever, a member operable by each of said key levers connected to release said

clutch means for driving engagement with said sleeve, means to lock said member against operation, a first electromagnet to move said locking means to locking position, a pair of contacts individual to each said key disposed to be closable by the respective key lever, a first cam on said sleeve, lock pulse contacts disposed to be closable by said cam; said printing mechanism including a rotatable cam shaft, clutch means engageable to drive said shaft, means cyclically engageable with an element of the printing mechanism clutch means to disengage said element and retain the same latched in disengaged position, a second electromagnet disposed to release said element from latched position to effect driving of said cam shaft, means responsive to operation of any one of said keys to energize said second electromagnet, a second cam on said shaft, said cam being substantially circular and having a depression, locking contacts having a portion that lies in the depression in said second cam to permit said locking contacts to close when said shaft is stationary but to open said locking contacts when said shaft revolves; and means connecting said lock pulse contacts and said locking contacts to energize said first electromagnet when both lock pulse and locking contacts are concurrently closed.

3. Ciphering mechanism and printing mechanism responsive to operation of said ciphering mechanism, said ciphering mechanism including a rotatable cam sleeve, clutch means engageable to drive said sleeve, means to disengage said clutch means cyclically, a plurality of character keys each mounted on a key lever, a member operable by each of said key levers connected to release said clutch means for driving engagement with said sleeve, means to lock said member against operation, a first electromagnet to move said locking means to locking position, a pair of contacts individual to each said key disposed to be closable by the respective key lever, a cam on said sleeve, lock pulse contacts disposed to be closable by said cam; said printing mechanism including self-closing locking contacts, means to open said locking contacts when said printing mechanism operates; means connecting said locking contacts and said lock pulse contacts to energize said first electromagnet when both lock pulse and locking contacts are closed concurrently, and means to effect a cycle of operation of said printing mechanism when any one of said keys is depressed.

4. Ciphering mechanism and printing mechanism responsive to operation of said ciphering mechanism, said ciphering mechanism comprising a plurality of character keys, means operable in a discrete cycle in response to the depression of any one of said keys, said means including a cam, lock pulse contacts closable by said cam once each cycle of operation, means to lock said keys against operation, a first electromagnet to actuate said locking means; said printing mechanism including a rotatable cam shaft, clutch means engageable to drive said shaft, means to disengage said clutch means on completion of each rotation and latch the same in disengaged position, a second electromagnet to unlatch said clutch means, means controlled by any one of said keys to energize said second electromagnet, a second cam on said cam shaft, self-closing locking contacts disposed to be opened by said second cam when said shaft rotates, and means connecting said lock pulse contacts and said locking contacts to energize said first electromagnet when said lock pulse and said locking contacts are concurrently closed.

5. Ciphering mechanism and printing mechanism connected to be controlled by operation of said ciphering mechanism, said ciphering mechanism comprising a plurality of character keys, means operable in a discrete cycle in response to the depression of any one of said keys, said means including a cam, lock pulse contacts closable by said cam once each cycle of operation, means to lock said keys against operation, an electromagnet controlled by said contacts to actuate said locking means;

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said printing mechanism including a rotatable cam shaft, and means operative when said shaft is stationary to energize said electromagnet when said lock pulse contacts are closed.

6. Ciphering mechanism and printing mechanism 5 connected to be controlled by operation of said ciphering mechanism, said ciphering mechanism comprising a plurality of character keys, means to lock said keys against operation, an electromagnet to actuate said means, self-opening lock pulse contacts, means responsive to operation of any one of said keys to close said contacts momentarily, and means in said printing mechanism 10 connected to cooperate with said lock pulse contacts under certain non-operating conditions of said printing mechanism to energize said electromagnet.

7. Ciphering mechanism and printing mechanism controlled thereby, comprising a respective rotatable shaft in each said mechanism, a locking circuit including a pair of contacts closable by rotation of the shaft in said cipher-

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ing mechanism and in series therewith a pair of contacts in said printing mechanism closed only when the shaft in said printing mechanism is at rest, and means actuated by current through said locking circuit to prevent operation of said ciphering mechanism when both pairs of contacts are closed simultaneously.

8. Ciphering mechanism and printing mechanism controlled thereby, comprising a respective rotatable shaft in each said mechanism, and means controlled by the simultaneous operation of the shaft in said ciphering mechanism and non-operation of the shaft in said printing mechanism to lock said ciphering mechanism against operation.

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