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1,964,268

ELECTROMAGNETIC DEVICE

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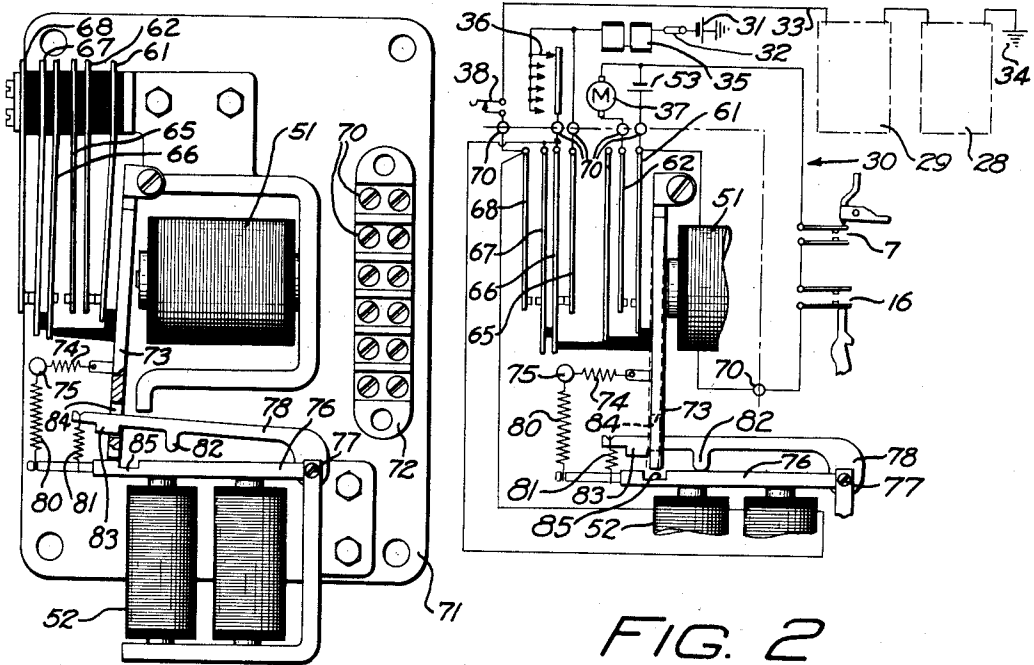


FIG. 2

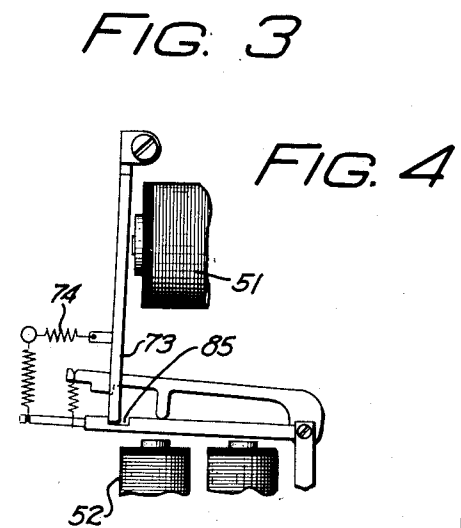


FIG. 3

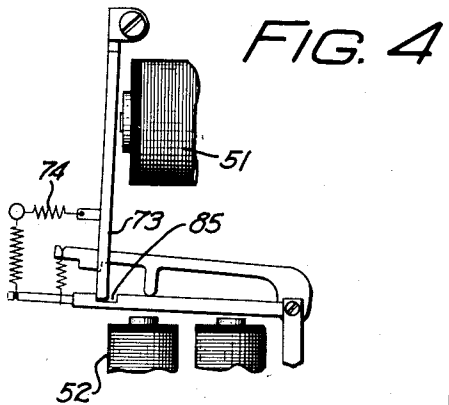


FIG. 4

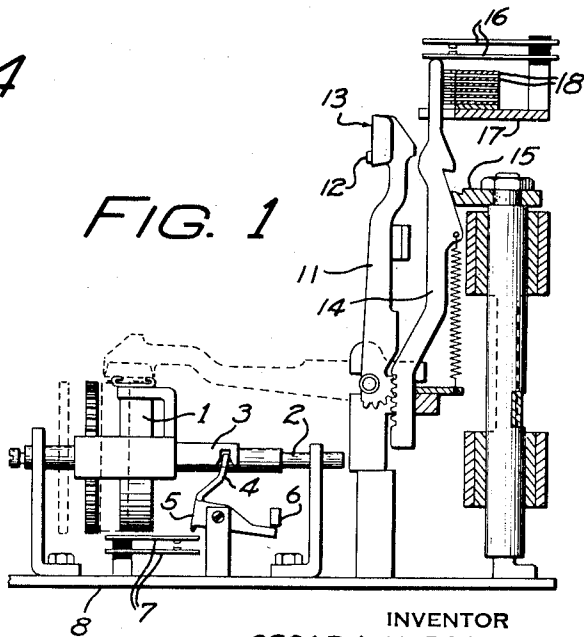


FIG. 1

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ELECTROMAGNETIC DEVICE

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13 Claims. (Cl. 178—4.1)

This invention relates to systems and apparatus for operating printing telegraph machines, and more particularly to telegraph systems and apparatus for controlling remotely the operation of the driving motors of such machines.

The system of the present invention is particularly adapted for isolated telegraph lines which are not associated with switchboards or equivalent switching equipment. In such isolated lines the control of the motors for starting and stopping cannot be exercised automatically by the connection and disconnection of the line at a switching point, and the control therefore must be exercised arbitrarily and voluntarily by the persons operating the system.

Systems for such remote control have been devised, and the object of this invention therefore is to provide a simplified system of motor control devices, auxiliary to the apparatus for the transmission of intelligence, such that an arbitrary action on the part of an operator at one station may result in the control of motors at all other connected stations.

A further object is to provide a system wherein the control of the motors may be effected as much as possible by the apparatus normally provided for the transmission of intelligence, whereby the added apparatus necessary for the purpose of motor control is kept at a minimum.

A feature is to provide a telegraph system so arranged that it may be left unattended by removing all power or signaling current from the line circuit, without producing any adverse or undesirable effect upon the motor control system or upon the motors controlled thereby.

A further feature is to arrange the circuit connections so that the motor control element may be detached for interchangeability or may be fixed apart from the receiving printer and motor for convenience in maintenance.

A still further feature is to provide a system in which local operations requiring electric current are supplied with current from a local source and are not dependent upon current received over the line circuit and limited in quantity by the normal resistance of the line circuit.

The objects of the present invention are attained by providing electric contacts and electromagnets for operating them, the operation of the contacts being effected in part by the normal telegraphic transmission apparatus. The motor-stop control contacts are operated in predetermined order by the transmission of predetermined intelligence code signals which are not recorded on the printing telegraph receiver. This results

in stopping the motor with the line closed and with the normal current of an idle line. The interrelation of electromagnets, armatures and contacts is such that the current in the line may be discontinued to produce a change in the positions of the controlling armatures but not to start the motors. Subsequently the current in the line may be reestablished to produce a further change in the condition of the armatures which will start the motors and which will return the control elements to normal idle state. A stopped motor may be restarted by an interruption followed by a reclosing of the line circuit, and the interruption may be momentary or may continue for any interval of time.

A clear understanding of the invention may be had from the following description, taken in conjunction with the accompanying drawing wherein,

Fig. 1 shows the printing elements of a well known type of printer or telegraph typewriter with the embodiment of the present invention.

Fig. 2 shows a circuit which embodies the invention in a motor control system of three stations.

Fig. 3 shows details of the control apparatus with the operating circuit of the motor closed.

Fig. 4 shows parts of Fig. 3 in a position where the motor operating circuit is open and with the line circuit without current.

The practice of selection in printing telegraphs is to divide the total number of characters which it is desired to print selectively into two groups of which one group contains the letters and characters more frequently used and the other group contains the figures and characters less frequently used. The selection of a character then comprises two successive selections, first, the selection of the group called "case" and then the selection of the character in that case. The selection of the case is recorded by locking the mechanism of the receiving printer in such manner that all subsequent selections will be printed in that case until control is received to change to the alternative case. Letter case requires selection among at least twenty-six characters while figure case does not demand so many and therefore offers space selections which are not demanded for printing. This invention takes advantage of the condition offered by the spare selections and uses one of these spare selections in the figure case as a selective medium to control the stopping of the driving motor of the telegraph instrument. Thus, by a selective code establishing the figure case followed by a selective code which is idle for printing purposes, in that it is

not required to print a character in the figure case, a selective medium is obtained which is used for controlling the motors.

Each of the selections involves a mechanical action in the telegraph printer. To convert the mechanical actions into electrical control for the motors this invention provides electrical contacts which are operated by the type printing mechanism when the latter is in a position to print the proper case characters. In the instance of the motor control signal, these contacts will be operated momentarily or in the specific embodiment concurrently because in going into the figure case position the figure case contacts are arranged to remain operated during the period that the printer mechanism remains in that position, during which period the character selection devices will operate the character contacts momentarily.

The manner of adding these contacts to the telegraph printer varies with the type of printer to which the motor control system is applied. In Fig. 1 the printer shown is of the type disclosed in the patent to H. L. Krum, No. 1,796,378 issued March 17, 1931, and a more detailed explanation of the structure may be had by reference to that patent. For typewheel printers, the character contacts may be operated by a cam on the typewheel or on its shaft and the case contact may be operated by any mechanical part which occupies one position for one case and another position for another case. The means for operating a character contact in a typewheel printer of the code disc and permutation type is described in the patent to A. F. Dixon, No. 1,201,809 issued October 17, 1916. In the printer there shown the case contacts would be operated by the armature 220 of the shift magnet 214.

In the further description, the contacts will be referred to as "shift" and "M", the shift contact being the contact which is operated by shifting from letter case to figure case and the M contact being the contact which is operated by the action which prints the letter M in the letter case but which does not print anything in the figure case position due to the fact that this particular type position is left blank.

Referring now to Fig. 1, a cylindrical platen 1 is arranged to slide upon a fixed shaft 2 by control of an extension 3 which is articulated with an operating arm 4 of a rocker 5. The rocker 5 is engaged by a member 6 which in turn may be operated by the selecting mechanism of the printer in response to the case shift condition or code received over the line wire. A pair of contacts 7 are fixed to the frame 8 of the printer in such manner that when the platen 1 is in the letter case position, as shown, the contacts will be open and when the platen 1 is in the figure case position, shown dotted, the contacts 7 will be closed because the rocking member 5 will occupy its alternative position.

The printing mechanism comprises a plurality of typebars each having a letter type 12, some of which have a figure type in the location 13, but the typebar 11 shown for the letter M is without a printing type in the location 13. Each typebar has a pull bar 14 geared to the typebar and operable by a power member 15, whenever the pull bar has been selected by a received code to set the permutation bars 18. A pair of contacts 16 are mounted upon a frame member 17 in such manner that they will be engaged and closed by the pull bar 14 of the letter M whenever the typebar 11 of the letter M is operated. When printing the letter M, in letter case, the contacts 16 will

be closed but the contacts 7 will not be closed. When printing figures, the contact 7 will be closed but the contact 16 will not be closed because its controlling pull bar will not be used in printing. In response to the signals for "shift-M" the contact 7 will be closed continuously while in the shifted position and the contact 16 will be closed momentarily when the pull bar 14 for the letter M is operated resulting in stopping the motor as will be described.

Referring to Fig. 2, the shift contacts 7 and the M contacts 16 are labeled as in Fig. 1. Three stations 28, 29 and 30 are shown which are identical except for the main line power supply. At station 30, a grounded battery 31 supplies power through a main switch 32 and main line 33 to ground at 34 but should it be desired to add stations the ground at 34 is replaced by a further line wire which passes through the added stations to ground thus completing the return to the battery 31. The telegraphic printing equipment is represented by the selector magnet 35, a sending transmitter contact 36 and a motor 37. The motor control device comprises the magnets 51 and 52 which operate in the order mentioned, the motor starting key 38 normally closed and electrical contacts operated by the armature of the magnet 51.

Relay 51 is connected in circuit with a local source of current 53 and the contacts 7 and 16 in series. The motor 37 is connected in a circuit with the source of current 53 and the contacts 61, 62. The line circuit extends from line wire 33 through key 38, contacts 68 and 67 when closed, through transmitter 36 and receiver magnets 35 to battery or to ground or to an extension line wire to complete the line circuit. Should the contacts 67 and 68 be opened as shown in Fig. 2 the line circuit will be as traced above except that it will pass from key 38 through magnet 52 to transmitter 36 instead of through the contacts 67, 68. The two terminals of the transmitter 36 are connected to the two contacts 65 and 66 and the transmitter contacts are short-circuited when the magnet armatures are in position to stop the motor, as shown in Fig. 2. The circuit connections for the magnets 51, 52 and all the contacts 61, 62, 65, 66, 67 and 68 are made through terminals 70 so that the motor control unit mounted upon a frame plate 71 may be detached and removed by disconnecting its wires at the terminals 70 of the terminal block 72 in Fig. 3. The magnet 51 has an armature 73 at all times under tension of a spring 74 which is attached to the armature 73 and to a post 75 in the frame plate 71. The magnet 52 has an armature 76 pivoted upon the pivot 77 which is common to the latch 78 also. An armature 76 for electromagnet 52 is under tension of a spring 80 attached to the armature 76 and to the post 75. A latch 78 is under tension of a spring 81 attached to the latch 78 and to the armature 76. Latch 78 has a stop lug 82 which engages the armature 76 and has a further lug 83 which engages the armature 73 by engaging the edge of a hole 84.

The armature 76 and the member 78 thus constitute two latches for the armature 73, operative respectively in the two median positions of the armature 73, the armature 76 constituting in itself one of the latches and also operating to govern the other latch.

When the armature 73 is in its attracted position its free end is opposite the notch 85 in the armature 76 as shown in Fig. 2 and the edge of the hole 84 in armature 73 clears the lug 83 on the latch 150

78. When the armature 73 is released by deenergization of the magnet 51 and the armature 76 remains in its attracted position, the armature 73 will engage the lug 83 of the latch 78 and will be held, with its free end still opposite the notch 85. When the armature 76 is released by deenergization of the magnet 52 it will move under power of the spring 80 and will include the end of the armature 73 within the notch 85. At the same time it will push the lug 82 to lift the lug 83 out of engagement with the edge of the hole 84, and the armature 73, released from the latch 78, will move under power of the spring 74 until it is stopped by engagement with the edge of the notch 85 as shown in Fig. 4. Electric contacts 61 to 68 remain unchanged from the condition shown in Fig. 2. Upon the energization of the magnet 52 the armature 76 releases the armature 73 and the spring 74 then moves the armature 73 to operate the contacts 61, 62, 65, 66, 67 and 68.

The operation of the system is as follows:

In condition of non-operation of the system, the switch 32 is open, all magnets are unenergized, the armatures 73 and 76 are interlocked as shown in Fig. 4, the contacts 61, 62, 65, 66, 67, 68 are in the condition shown in Fig. 2 and all motors are non-operating.

To put the system in operating condition the switch 32 is closed which establishes the normal line current through battery 31 and the line 33 and ground including in the circuit at each station the receiver magnets 35, the contacts 65, 66 and the magnets 52. At each station a magnet 52, when switch 32 is closed, operates its armature to permit the armature 73 to move from its position shown in Fig. 4 to its position shown in Fig. 3. This at each station operates the contacts 67, 68 to shunt the magnet 52 and thus deenergize it, to open the contacts 65, 66, to render the transmitter operable, and to close the contacts 61, 62 to close the operating circuit of the motor 37. After transmission, if any, all motors may be stopped by sending the code for shift thus closing the contacts 7 and then sending the code for M thus closing the contacts 16 momentarily thereby energizing the magnet 51 momentarily. At the beginning of the electrical impulse through magnet 51, the armature 73 moves to its solid-line position in Fig. 2, and the contacts 67, 68 open to switch the magnet 52 into the line circuit 33. The magnet 52 energizes and operates its armature from the position shown in Fig. 3 into the position shown in Fig. 2, the latch 78 moves toward the armature 76 and positions its lug 83 in the path of movement of the edge of the hole 84 in the armature 73. At the end of the electrical impulse through magnet 51, the armature 73 is released by its magnet and moves to its dotted-line position in Fig. 2 where it is held by the lug 83 of the latch 78. The contacts 65, 66 now are closed to shunt the transmitter 36 and the contacts 61, 62 now are open to stop the motor 37. The magnet 52 at the respective stations remains energized by the line current. This is the normal condition of the operating line awaiting service from any station.

The impulse of current received by the magnet 51 is momentary and the period of time in which the magnet 52 must energize to control the latch 78 and lug 83 to engage the armature 73 is very short and it is an advantage to have the armature 76 held mechanically depressed by the end of the armature 73 to assist the magnet 52 to begin its control of the armature 76 at the earliest possible instant. Preferably the contacts 67, 68

open before the armature 73 clears the edge of the notch 85 so that the armature 76 is not required to move while the armature 73 passes from fourth position to first and then to second.

The system will remain in the condition now attained with all motors stopped until a manual operation is performed at any connected station to start all of the motors.

To start the motors the key 38 is operated to open the line circuit momentarily. The opening of key 38 stops the current from battery 31 and deenergizes all magnets 52 thus advancing all armatures 73 from the dotted position of Fig. 2 to the position of Fig. 4. The subsequent closing of the operated key 38 will close the line circuit and energize all magnets 52 thus advancing all armatures 73 from the position shown in Fig. 4 to the position shown in Fig. 3 thereby shunting and deenergizing all magnets 52, starting all motors 37 and enabling all transmitters 36 for operation.

To close the system for nights and holidays the switch 32 is opened instead of switch 38, with the effect as described for opening the switch 38, and the switch 32 then is left open until business is to be resumed.

Although the invention has been described in connection with a specific form thereof, it will be understood that it has further application and that it is not limited by the embodiment shown for illustration.

The invention claimed is:

1. In a remote control device, a main armature, contacts on said main armature to control a circuit, said main armature having four operating positions, a spring to urge said main armature toward and into its second, third and fourth positions, a magnet to urge said armature from its fourth position into its first position against the urge of said spring, a latch to restrain said main armature in its second position, and a further armature adapted to engage directly said main armature to restrain it in its third position, said further armature also controlling said latch.

2. In a remote control device, a first armature, contacts movable by said first armature to control a circuit, said armature having four positions, a magnet to operate said first armature, a spring for said first armature, and two latches for said first armature operative successively to restrain said first armature in its two median positions respectively against said spring, one of said latches being a further armature directly engaging said first armature.

3. In a remote control device, a first armature, a magnet for attracting said first armature, an operating armature positioned to retain mechanically said first armature in attracted position, and a contact normally shunting the winding of said magnet and controlled by said operating armature to open early in the attractive movement of said operating armature for energizing said magnet whereby said first armature is placed under control of its magnet before it is released mechanically.

4. In a telegraph system, a telegraph selector, a line circuit, a local magnet, a local circuit for said magnet and controlled over said line circuit through said telegraph selector, a control armature for said magnet, a latch magnet, a latch armature for said latch magnet, said latch armature directly engaging said control armature to restrain said control armature, contacts operable by said control armature, and a motor for

driving said telegraph selector and controlled by said contacts.

5. In a telegraph system, a telegraph selector, a motor for driving said selector, a relay for controlling said motor, a latch magnet and armature for latching the armature of said relay, a local circuit and a local source of power for said relay, a line circuit and a remote source of power for said latch magnet, and means whereby said selector may control said local circuit.

6. In a telegraph system, a selector having case shift mechanism, a motor for driving said selector, an electrical contact closed by said shift mechanism when operated for figures case, another electrical contact in said selector and closed by said selector by a predetermined selection, a motor control relay, a local circuit including said contacts said motor control relay and a local source of power and operating to stop said motor in response to the simultaneous closing of both of said contacts, and a latching device for said motor control relay.

7. In a motor control telegraph system, a selector having case shift mechanism, a motor for driving said selector, an electrical contact closed by said shift mechanism when operated for figures case, another electrical contact in said selector and closed by said selector by a predetermined selection, a motor control relay, a local circuit including said contacts said motor control relay and a local source of power and operating to stop said motor in response to the closing at the same time of both of said contacts, and a latching device for said motor control relay operable to unlatch by remote control independently of said selector.

8. In a motor control telegraph system, a selector having case shift mechanism, a motor for driving said selector, an electrical contact closed by said shift mechanism when operated for figures case, another electrical contact closed by said selector by a predetermined selection, a motor control relay, a local circuit including said contacts, said motor control relay and a local source of power and operating to stop said motor in response to the closing at the same time of both of said contacts, a latching device for said motor control relay, a mounting plate, and electrical terminal posts mounted upon said mounting plate, said relay and said latching magnet mounted upon said plate and wired to said terminal posts whereby said mounting plate and its associated apparatus may be positioned interchangeably and remotely from said selector.

9. In a remote control device, a line circuit, a local circuit, contacts to control said local circuit, a member to control said contacts, said member having four operating positions, means to operate said member from its fourth position to its first position in response to signals over said

line, a spring to urge said member towards and into its second, third, and fourth positions, a latch engaging said member to restrain it in its second position, an armature engaging said member to restrain it in its third position, and a magnet for controlling said armature and said latch.

10. In a printing telegraph system, a line circuit, a driving motor, a motor circuit, a member to control said motor circuit, said member having four operating positions, means to operate said member from its fourth position to its first position in response to signals over said line, a spring to urge said member towards and into its second, third, and fourth positions, a latch to restrain said member in its second position, a further latch to restrain said member in its third position, and a magnet responsive to signals over said line, one of said latches comprising an armature for said magnet and controlling the other latch.

11. In a printing telegraph system, a line circuit, a printing telegraph selector operable by signals over said line circuit, a motor for driving said selector, a motor circuit, contacts to control said motor circuit, a member to control said contacts, said member having four operating positions, means controlled by said selector to operate said member from its fourth position to its first position in response to signals over said line, said contacts operable by said member when in its fourth position only, a spring to urge said member towards and into its second, third, and fourth positions, a latch to restrain said member in its second position, an armature to operate said latch and itself engaging said member to restrain said member in its third position, a magnet for said armature, and a circuit for said magnet also controlled by said contacts.

12. In a remote control device, a line circuit, a local circuit, an operating member, means responsive to signals over said line circuit for operating said member from one extreme position to the other to control said local circuit, a spring for said member, an armature engaging said member in a mean position, and a latch controlled by said armature to further control said member.

13. In a printing telegraph system, a line circuit, a motor, a motor circuit, an operating member for said motor circuit having a plurality of positions, means responsive to signals over said line circuit for returning said member in one step from its last position to its first position, a spring for said member, an armature directly engaging said member and an armature-controlled latch for said member to advance said member step-by-step, and a magnet responsive to signals over said line circuit for controlling said armature and latch.

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