

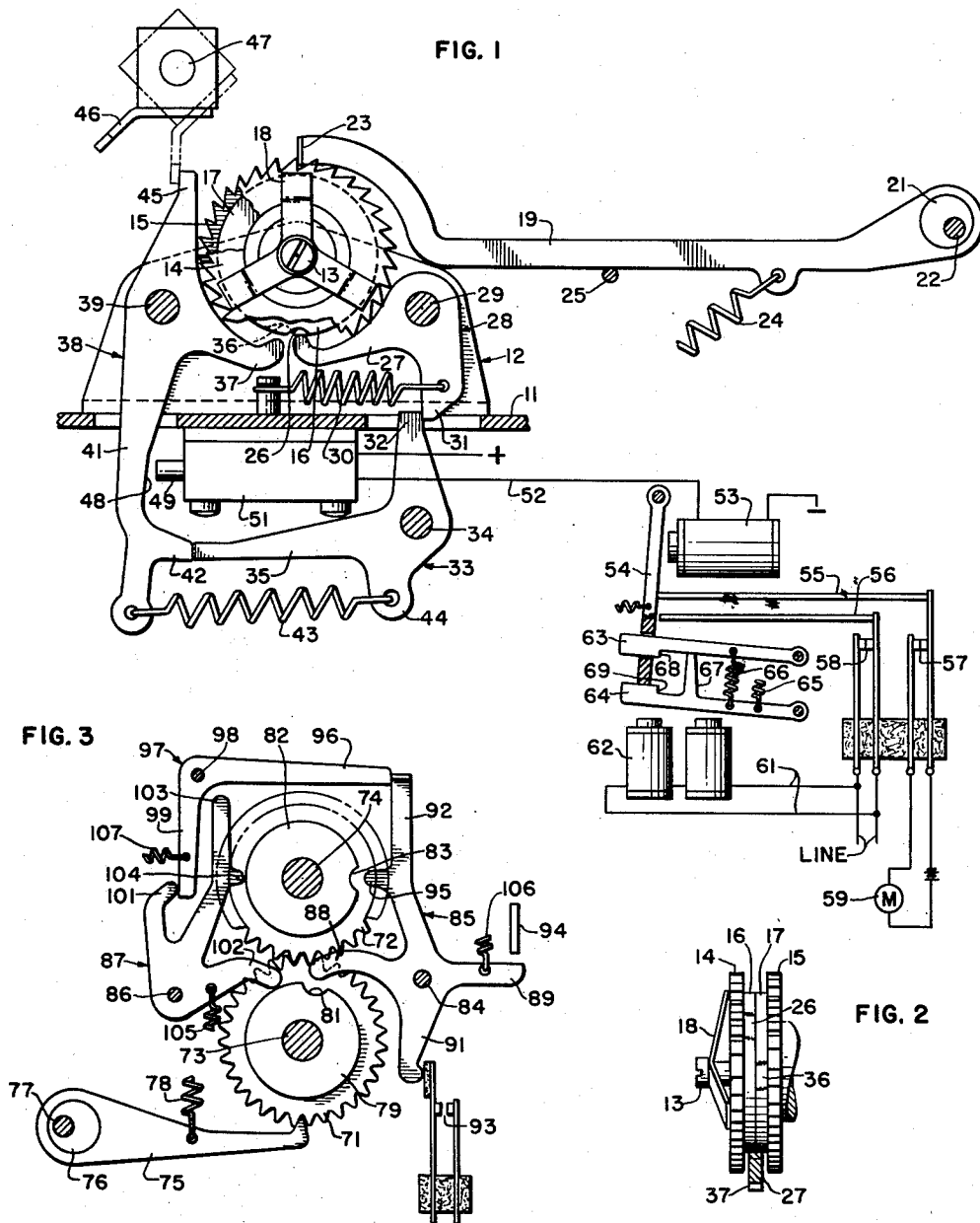
March 16, 1954

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2,672,501

MOTOR CONTROL DEVICE FOR TELEGRAPHY

Filed Dec. 5, 1950



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2,672,501

MOTOR CONTROL DEVICE FOR
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Application December 5, 1950, Serial No. 199,280

5 Claims. (Cl. 178-4.1)

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The present invention relates to remote control systems and apparatus and more particularly to automatic motor stop mechanisms.

The system of the present invention is particularly adapted to telegraph lines having untended stations. In such isolated lines it is desirable to stop the motors automatically when no signals are received for a predetermined period and to start the motors upon resumption of signal transmission.

It is therefore the principal object of the present invention to provide a simplified motor control arrangement which can be embodied in an apparatus for the transmission of intelligence such that when there is no traffic on the signal line for a predetermined period the motors at all of the connected stations are stopped.

Another object of the present invention is to provide facilities in each apparatus connected in the line whereby no motor will be stopped while the printing apparatus is in operation.

The objects of the present invention are attained by providing a motor control device including timing facilities comprising a pair of ratchet wheels, one of which is provided with one tooth more than the other, each ratchet having integral therewith a disc having a single peripheral notch, whereby upon rotation of said ratchet wheels and discs, said notches will register or be in coincidence with each other periodically to effect the operation of a contact for controlling a motor circuit.

A more comprehensive understanding of the invention may be had from the following description, taken in conjunction with the accompanying drawings wherein,

Fig. 1 is an elevational view of a preferred embodiment of the motor control device according to the present invention together with a diagrammatic illustration of the electrical components associated therewith;

Fig. 2 is an end view of the ratchet and disc arrangement of the motor control device; and

Fig. 3 is an elevational view of an alternate form of motor control device.

Having reference to Fig. 1 of the drawings, the base plate of the apparatus is indicated at 11 on which is mounted a bracket 12. Freely carried on a pivot stud 13 secured to the bracket 12 are a pair of ratchet wheels 14 and 15. Integral with the ratchet wheel 14 is a disc portion 16, and integral with the ratchet wheel 15 is a disc portion 17. The disc portions 16 and 17 are contiguous and are so maintained by the spring clamping instrumentality 18. In the present em-

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bodiment of the invention the spring clamp 18 is shown as a three-pronged element adapted to maintain a frictional relationship between the ratchet and disc elements.

Operatively related to the teeth of the ratchet wheels 14 and 15 is a pawl member 19 articulated to an eccentric drive means 21 rotatably secured to a drive shaft 22 appropriately carried in the apparatus. Pawl 19 is provided at its free extremity with a laterally disposed tooth portion 23 which is adapted to span both ratchets 14 and 15 and to thereby cooperate simultaneously with the teeth thereof. Pawl member 19 is normally biased in a counterclockwise direction by spring 24 to maintain the tooth 23 in operative relation to the ratchet teeth. A limiting stop 25 is provided to insure said operative relation.

Disc 16 is provided with a single peripheral notch 26 which with a notch 36 on disc 17 coacts with an arm 27 of a bell crank lever 28 mounted pivotally on a pivot stud 29 secured to the bracket 12. The depending arm 31 of bell crank lever 28 cooperates through suitable openings in base plate 11 with the vertical arm 32 of a bell crank lever 33 mounted pivotally on a pivot stud 34 appropriately carried in the apparatus. The lever 33 is also provided with a horizontal arm 35 for a purpose to be presently described. Lever 28 is normally biased clockwise by a spring 30.

Disc 17 is provided with a single peripheral notch 36 which with the notch 26 on disc 16 coacts with an arm 37 of a plural-armed lever 38 mounted pivotally on a pivot stud 39 secured to the bracket 12. The depending arm 41 of lever 38 extends through a suitable opening in base 11 and is provided with a lateral projection 42 adapted to cooperate endwise with the extremity of arm 35 of lever 28. Attached to the free end of lever arm 41 is one end of a spring 43, the other end of which is secured to a projection 44 on lever 33. Spring 43 thus tends to impart clockwise rotation to lever 38, as well as to maintain projection 42 and arm 35 in endwise contactual engagement under certain operating conditions hereinafter described. The vertical arm 45 of lever 38 is adapted to cooperate with a bail member 46 carried on a rock shaft 47 appropriately positioned in the apparatus. The shaft 47 is analogous to the shaft 371 shown in Fig. 15 of U. S. Patent No. 2,505,729.

The surface 48 of lever 38 cooperates with the plunger 49 of a switch 51 secured to base plate 11. Switch 51 controls a circuit extending from positive battery source, through switch 51, over

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conductor 52, through the winding of magnet 53 to negative battery. Magnet 53 is a part of a control device comparable to the arrangement disclosed in U. S. Patent No. 1,964,268, schematically shown herein. Magnet 53 is provided with an armature 54 which, through a pair of plunger type links 55 and 56, controls a pair of contacts 57 and 58, respectively. Contacts 57 are included in the circuit of a motor 59, and contacts 58 are included in the line circuit. The line circuit extends over conductors 61 through a line magnet 62, which is shunted when the contacts 58 are closed.

As was previously mentioned, the pair of ratchets 14 and 15 are provided with different numbers of teeth; for example, in the present embodiment of the invention, one ratchet is provided with thirty teeth and the other ratchet is provided with thirty-one teeth, so that indices on the ratchets, such as the notches 26 and 36 on the discs 16 and 17 will coincide every 930 turns (30×31) of the main shaft 22. As indicated in Fig. 2 the arms 27 and 37 span both of the discs 16 and 17. Thus in the course of the stepping movements of the two ratchet wheels 14 and 15 by pawl 19, the notches 26 and 36 will coincide periodically to permit the end of arm 27 to fall therein due to the action of spring 30 upon the lever 28, whereupon lever 28 will be rotated clockwise a predetermined amount to impart counterclockwise rotation to lever 33 to disengage arm 35 from projection 42, thus permitting spring 43 to bias the lever 38 counterclockwise to bring the end of arm 37 of lever 38 into engagement with the peripheries of discs 16 and 17. Then after a predetermined interval the notches 26 and 36 will again coincide, but this time over the end of arm 37 to permit the end of arm 37 to fall therein to permit additional counterclockwise movement of lever 38 whereupon surface 48 of lever 38 will press the plunger 49 of switch 51 to effect the closing of said switch to complete the circuit for magnet 53 which will become energized and will pull up or attract its armature 54. If, during the rotation of the ratchets 14 and 15, and hence the discs 16 and 17, the bail 46 is oscillated between the full line and dotted line positions, the lever 38 will be rotated clockwise to cause the projection 42 to swing clear of the arm 35 of lever 33 to permit the end of arm 35 to again block counterclockwise movement of lever 38 and to hold the end of arm 37 free of the peripheries of discs 16 and 17 as shown in Fig. 1.

In the operation of the motor control device shown in Fig. 1, it is assumed that the circuit for motor 59 is closed at contacts 57 and hence the motor of the telegraph apparatus is running and that, therefore, the main shaft 22 is rotating. The main shaft 22 in rotating, thus causes the pawl 19 to be reciprocated to step the ratchets 14 and 15. It is further assumed that there is traffic on the signal line and accordingly the shaft 47 will be rocked for each operation of the telegraph apparatus in response to signals received. The bail 46 will therefore act upon lever 38 as previously described to maintain the latching relationship between projection 42 and arm 35. Thus, even if during signal reception, the notches 26 and 36 coincide to permit clockwise movement of lever 28 to disengage arm 35 from projection 42, this condition will exist only momentarily because the shaft 47 is still rocking and hence bail 46 is acting cyclically upon lever 38 to reengage the

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projection 42 and arm 35 as indicated in Fig. 1. Therefore, switch 51 cannot operate to close the circuit for magnet 53.

Now, if traffic on the signal line should cease, then the bail 46 will no longer oscillate, but remain in its solid line position, while the main shaft 22 is still rotating to continue to reciprocate the pawl 19. The ratchet wheels 14 and 15 will continue to be rotated until the notches 26 and 36 coincide to permit lever 28, under the pull of spring 30, to operate lever 33 to disengage arm 35 from projection 42. Now, lever 38 will be actuated counterclockwise by spring 43 to bring arm 37 in contact with the peripheries of discs 16 and 17, but not enough to depress the plunger 49 of switch 51. Rotation of ratchets 14 and 15, and hence discs 16 and 17, will continue until the notches 26 and 36 again coincide to permit the end of arm 37 to fall therein to cause the surface 48 of lever 38 to press against the plunger 49 sufficiently to operate the switch 51, to close the circuit for magnet 53.

The magnet 53, upon operating, will pull up its armature 54, and through members 55 and 56 cause contacts 57 and 58 to be opened. The motor 59 will stop running due to the cutting off of the power therefor by the opening of contacts 57. The armature 54 becomes latched in its attracted position by a latch element 63. This is necessary because the shaft 22 does not stop immediately, but only gradually as the motor 59 is brought to a stop. When the shunt contacts 58 are opened, the magnet 62 will be energized by the line circuit current, which is normally marking in the stop condition. Magnet 62, when operated will pull up its armature 64 against the pull of its spring 65. A spring 66 normally pulls latch 63 and armature 64 toward each other, and a projection 67 integral with the armature 64 limits the space between latch 63 and armature 64. When the magnet 53 is energized and the armature 54 is attracted, the contact 58 opens and the magnet 62 is immediately energized and the armature 64 is immediately pulled up, stretching spring 66 and permitting the armature 54 to be held latched by shoulder 68. This condition will persist so long as no signals are received on the signal line, which therefore remains in a marking condition (current on the line).

However, as soon as a spacing or no current signal is received, the armature 64 will be released and its spring 65 will actuate it until the projection 67 strikes the latch 63 to raise latch 63 out of latching engagement with the shoulder 68. It must be understood however, that when the de-energization of magnet 62 occurs, the armature 54 is still pulled up, and therefore the end of armature 54 becomes latched up by the shoulder 69 of armature 64. Thus, sufficient clearance is provided for the unlatching of latch 63 from armature 54, and the latching of armature 54 by shoulder 69 of armature 64 instead. This substitution of latching elements for armature 54 is a precautionary measure in the event the occurrence of a spacing condition is a line break instead of a spacing impulse inherent in signaling. Thus, if a break in the line circuit should occur after the motor has been stopped as just described, the motor 59 will not be started accidentally. Then when a marking condition (closed line) again occurs the magnet 62 will be operated and the armature 64 will be pulled up to release armature 54 and cause the closure of con-

tacts 57 and 58, thereby starting the motor 59 and shunting the magnet 62.

A modified form of the present invention is shown in Fig. 3 in which the ratchet gears of the pair of ratchet gears 71 and 72 are mounted on independent shafts 73 and 74. Gear 71 is in mesh with gear 72 and motion is imparted to gear 71 by a pawl 75 carried on an eccentric 76 fixed to a drive shaft 77. A spring 78 normally biases the pawl 75 into engagement with the gear 71. Integral with gear 71 is a disc member 79 provided with a peripheral notch 81. A disc 82 provided with a peripheral notch 83 is fixed to the gear 72. In the embodiment shown in Fig. 3, gear 71 is provided with thirty-one teeth and gear 72 is provided with thirty teeth.

Pivotaly mounted on a pivot shaft 84 appropriately positioned on one side of discs 79 and 82 is a plural-armed lever 85. Also, mounted pivotally on a pivot shaft 83 appropriately located on the other side of discs 79 and 82 is a plural-armed lever 87. Lever 85 is provided with a leftwardly directed arm 88, a rightwardly directed arm 89, a depending arm 91 and a vertical arm 92. Arm 88 of lever 85 is adapted to cooperate with the periphery of disc 79 and to coact with notch 81 as will presently appear. Arm 91 is adapted to control a switch contact 93, analogous to switch 51 in Fig. 1. Arm 89 is adapted to cooperate with a signal controlled and cyclically operable member 94 comparable to bail 46. Vertical arm 92 of lever 85 is provided with a lateral projection 95 adapted to cooperate with the periphery of disc 82 and to coact with the notch 83. The laterally disposed extremity of arm 92 cooperates with the horizontal arm 96 of a bell crank 97 mounted pivotally on a pivot 98, the depending arm 99 of which cooperates with an arm 101 of plural-armed lever 87. Lever 87 is also provided with a rightwardly extending arm 102 confronting arm 88 and adapted to cooperate with the periphery of disc 79, and under certain predetermined operating conditions to coact with the notch 81. Lever 87 is further provided with a vertically directed arm 103 which, in turn, is provided with a lateral projection 104 confronting projection 95 and which is adapted to cooperate with the periphery of disc 82 and to coact with the notch 83.

In the operation of the arrangement shown in Fig. 3, the motor (not shown) is assumed to be running to impart rotation to the drive shaft 77 and hence to cause pawl 75 to reciprocate, to thereby impart rotation to ratchet gears 71 and 72 and to the disc members 79 and 82. During signal reception, the member 94 is reciprocated cyclically, and in so doing causes the lever 85 to oscillate in timed relation therewith. In this condition of operation, the lever 85 is prevented from riding on the peripheries of discs 79 and 82 for any sustained period.

Lever 87, through its projections 102 and 104 always rides on the peripheries of discs 79 and 82. The relation of the gears 71 and 72, and discs 79 and 82 is such that the lever 87 will be actuated clockwise by its spring 105 when notches 81 and 83 coincide respectively with projections or arms 102 and 104 simultaneously. In the present embodiment such coincidence will occur every 930 turns (30×31) of the main shaft 77, and permit spring 105 to actuate lever 87 clockwise to cause arm 101 to rotate the bell crank 97 counterclockwise to unlatch the lever 85. Spring 106 will thus actuate lever 85 counterclockwise to cause arm 88 and projection 95 to ride on their respective

discs 79 and 82. Upon the continued rotation of gears 71 and 72 by pawl 75 the arm 102 and projection 104 will be cammed out of the respective notches 81 and 83 and spring 107 will attempt to rotate the bell crank 97 clockwise, but this action is prevented by the fact that arm 96 is resting on the end of arm 92.

Now, if signals are still being received, the member 94 will continue to oscillate and lever 85 will be again actuated clockwise and arm 92 thereof will be moved out of engagement with the arm 96 of bell crank 97 and lever 85 will again be blocked against counterclockwise movement by spring 106 until lever 87 is enabled by notches 81 and 83 to unlatch the arm 92. However, in the event the member 94 is quiescent following the unlatching of arm 92, the arm 88 and projection 95 of lever 85 will continue to ride on the peripheries of the respective discs 79 and 82 until the notches 81 and 83 coincide respectively with said projections or arms 88 and 95 simultaneously. In this event, the lever 85 will be actuated further in a counterclockwise direction to close the contact 93 to complete a circuit for energizing the relay analogous to relay 53 in Fig. 1. Otherwise the circuit associated with contact 93 is the same as that associated with switch 51 in Fig. 1. If at any time before notches 81 and 83 should coincide with arms or projections 88 and 95, the member 94 should again operate, for example, in response to signal reception, the arm 92 will again become latched up by the bell crank lever 97 to await the reinitiation of the motor stopping cycle.

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

The invention claimed is:

1. In combination, a timing mechanism comprising a pair of toothed elements having different numbers of teeth, a disc individual to each toothed element and movable therewith, each of said discs having a single peripheral notch, a common actuating member for rotating said toothed elements, whereby a predetermined operative relationship between said notches is periodically recurrent, a first means having facilities for simultaneously sensing said discs for coaction with said notches, a second means having facilities for simultaneously sensing said discs for coaction with said notches, said first means responsive to a positionment of said notches in one of said operative relationships to condition said second means for operation, and a contact controlled by said second means, whereby said second means is effective in response to a positionment of said notches in another of said operative relationships to operate said contact.

2. In combination, a timing mechanism comprising a pair of toothed elements having different numbers of teeth, a common actuating member for rotating said toothed elements, whereby a predetermined operative relationship between said toothed elements is periodically recurrent, a disc individually fixed to each toothed element, each of said discs having a single peripheral notch, a first member having facilities for simultaneously sensing said discs for a coincidence of said notches, a second member having facilities for simultaneously sensing said discs for a coincidence of said notches, said first means responsive to a first coincidence of said notches to condition said second means for response to a sec-

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ond coincidence of said notches, a contact, and means responsive to the simultaneous sensing of said notches by said first and second members sequentially to control said contact.

3. In combination, a timing mechanism comprising a pair of toothed elements having different numbers of teeth, a common actuating member for rotating said toothed elements, whereby a predetermined operative relationship between said toothed elements is periodically recurrent, a disc having a single peripheral notch operably associated with each of said toothed elements, a first member having facilities for simultaneously sensing said discs for coaction with said notches, a second member having facilities for simultaneously sensing said discs for coaction with said notches, a latch means for said first member controlled by said second member in response to the simultaneous sensing thereby of said notches for unlatching said first member, a signal controlled cyclically operated member for periodically effecting the latching of said first member by said latch means, and a contact controlled by said first member, whereby in response to the non-operation of said cyclically operated member said second member is operated upon a simultaneously sensing of said notches to unlatch said first member which in response to a simultaneous sensing of said notches operates said contact.

4. In combination, a timing mechanism comprising a pair of toothed elements having different numbers of teeth, a disc individual to each toothed element and movable therewith, each of said discs having a single peripheral notch, a common actuating member for rotating said toothed elements, whereby a predetermined operative relationship between said notches is periodically recurrent, a first means having facilities for simultaneously sensing said discs for coaction with said notches, a second means having facilities for simultaneously sensing said discs for

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coaction with said notches, said first means responsive to an alignment of said notches in one of said operative relationships to condition said second means for operation, and a contact controlled by said second means, whereby said second means is effective in response to an alignment of said notches in another of said operative relationships to operate said contact.

5. In combination, a timing mechanism comprising a pair of toothed elements having different numbers of teeth, a common actuating member for rotating said toothed elements, whereby a predetermined operative relationship between said toothed elements is periodically recurrent, a first means having facilities for simultaneously sensing said discs for coaction with said notches, a second means having facilities for simultaneously sensing said discs for coaction with said notches, a latch means operated by said second means in response to one of said operative relationships to control the operation of said first means, a signal controlled cyclically operated means to cyclically reset said latch means, and a contact controlled by said first means, whereby upon a cessation of operation of said signal controlled means said first means is effective in response to another of said operative relationships to operate said contact.

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