

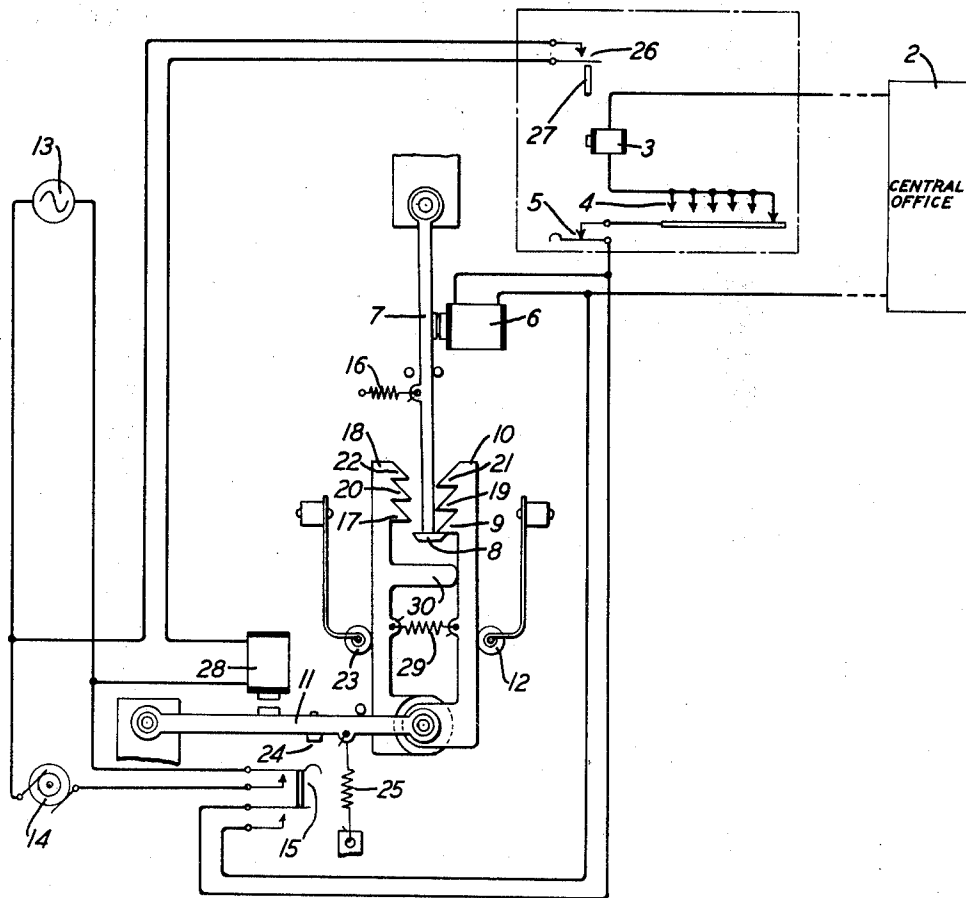
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REMOTE CONTROL OF MOTORS

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REMOTE CONTROL OF MOTORS

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This invention relates to a communication system and improved apparatus for controlling motors at remote points. More particularly, it relates to printing telegraph systems of the light traffic type in which the local power supplies for the motors at subscribers' printing telegraph stations are arranged to be remotely controlled. However, it is to be understood that this invention is not to be limited to printing telegraph systems.

In a communication system where the demands on distant motors are not continuous, such as in a light traffic printing telegraph system, it is desirable to operate the motors only when the working of the system requires such operation. This will reduce current consumption and maintenance expense. Several types of arrangements have been developed for performing this function.

However, for systems in which the transmission lines are normally closed, it has been found that, in the case of those arrangements which are designed to start motors in response to the closure of the transmission lines following a short open period, false operation may occur. For example, if a switchboard operator should stop the motor at a subscriber's station and in withdrawing the plug from the line jack cause a momentary interruption of line current, the motor at the subscriber's station would start and continue to run without the knowledge of the switchboard operator. This false operation might also be caused by the swinging together of open wire lines, by an induced surge of current due to lightning, or to any other cause which would result in a momentary cessation of line current. This false operation of remotely controlled motors is objectionable in that a motor at a subscriber's station may be caused to start and continue to run without the knowledge of the switchboard operator thereby wasting current from the power supply at that particular station as well as causing needless wear of the printing telegraph machine at that station.

It is an object of the present invention to provide an improved arrangement for starting and stopping motors at remote points.

It is also an object of this invention to reduce the amount of false operation of motors controlled from a remote point.

The preferred form of the invention will be described as applied to a printing telegraph system in which the transmission lines are normally closed.

It is to be understood that the invention is not

limited either to a system in which the transmission lines are normally closed or to a printing telegraph system.

The objects of this invention are accomplished by means of a special relay added to each subscriber's station, at which the motor is to be remotely controlled, and connected into the transmission line leading from that station to the central exchange office. This relay has a specially designed armature which co-acts with a plurality of pawls. After the operator at the central office has successively opened and closed the transmission line leading to a particular subscriber's station a preassigned number of times, the armature of the special relay at that subscriber's station will release the pawls which will close a path from the power supply at that station to the printer motor also at that station thereby starting the operation of the motor.

The operator at the central office may stop the operation of the motor by transmitting a special signal to that particular subscriber's station. This special signal actuates instrumentalities at the subscriber's station which open the path from the power supply to the motor and restore the special relay and pawls to their normal condition.

The invention may be better described with reference to the single figure of the drawing which represents a printing telegraph system arranged in accordance with this invention. Printing telegraph station 1 is connected by means of a normally closed loop to printing telegraph station 2 which, for the purpose of illustration, may be assumed to be a central office. Signal impulses may be sent from central office 2 out over a normally closed transmission line to station 1, through the subscriber's line relay 3, sending contacts 4, break key 5, special relay 6, and then back over a normally closed transmission line to central office 2.

Although only one printing telegraph station 1 is shown to be connected to central office 2, it is to be understood that this has been done for the sake of simplicity and that any desired number of printing telegraph stations may be connected by loops to central office 2. A special relay with its associated apparatus should be connected into the transmission line at each station at which the motor is to be remotely controlled.

As can be seen in the drawing, the armature 7 of special relay 6 is pivoted at one end. The other end of armature 7 has a projection 8 attached thereto. Projection 8 is, under the normal conditions shown in the drawing, normally engaged

with a tooth 9 of pawl 10 attached to lever 11. Lever 11 is maintained in its elevated position by reason of tooth 9 of pawl 10 engaging with projection 8 of armature 7. Pawl 10 is maintained in a nearly vertical position by means of spring roller 12. Also, under normal conditions the path from the source of power supply 13 through motor 14 of the printing telegraph set located at station 1 is open due to the upper set of contacts of switch 15 being in their open position thus causing motor 14 to be normally non-operated since power supply 13 is normally inoperative.

When the operator at central office 2 wishes to render power supply 13 operative and to start motor 14 in order to communicate with the subscriber at station 1, she momentarily opens the loop to station 1. The opening of the loop causes special relay 6 to release. Since armature 7 of relay 6 has a biasing spring 16 attached to it, when relay 6 releases, spring 16 will pull armature 7 to the left. This action will cause projection 8 of armature 7 to disengage from tooth 9 of pawl 10 and to engage with tooth 17 of pawl 18. This will enable both pawls 10 and 18, as well as lever 11, to move down one step. When the line closes again (the operator at central office 2 only opened it momentarily), relay 6 will again become energized and, since the force of its attraction is greater than the pull exerted by spring 16, armature 7 will be pulled to the right. This action will cause projection 8 to disengage from tooth 17 of pawl 18 and to engage with tooth 19 of pawl 10. This will enable both pawls 10 and 18 and lever 11 to move down one more step.

The operator at central office 2 again momentarily opens the line to station 1. Relay 6 again releases and spring 16 again pulls armature 7 to the left. This will cause projection 8 to disengage from tooth 19 of pawl 10 and to engage with tooth 20 of pawl 18 thereby enabling pawls 10 and 18 and lever 11 to again move down one more step. On the following closure of the line, relay 6 will again pull armature 7 to the right thereby disengaging projection 8 from tooth 20 of pawl 18 and causing it to engage with tooth 21 of pawl 10 thus letting pawls 10 and 18 and lever 11 move down an additional step.

This process of operation could be continued as long as desired provided that there were sufficient teeth on pawls 10 and 18 and provided that nothing impeded the downward progress of pawls 10 and 18 and lever 11. However, to simplify matters, it may be assumed that the preassigned signal to be used by the operator at central office 2 for the purpose of starting the motor at station 1 consists of three successive openings of the transmission line leading to station 1. Usually these three openings of the loop to station 1 would be of brief duration but they need not necessarily be so.

Upon the third successive opening of the loop leading to station 1, relay 6 will release, spring 16 will pull armature 7 to the left, projection 8 will disengage from tooth 21 of pawl 10 and will engage with tooth 22 of pawl 18, and pawls 10 and 18 and lever 11 will move down one more step. Then, when the loop is closed again, relay 6 will pull armature 7 to the right, projection 8 will disengage from tooth 22 of pawl 18, and, since in this case there are only three teeth on pawl 10, projection 8 will swing free from pawls 10 and 18.

Since the teeth of pawls 10 and 18 no longer engage with projection 8, pawls 10 and 18 are free to fall down. However, they will still be

maintained in a nearly vertical position by means of spring rollers 12 and 23. When pawls 10 and 18 fall down, lever 11 falls with them. However, lever 11 does not fall far before its contact 24 closes switch 15. Biasing spring 25 is attached to lever 11 in order to insure the closing of switch 15. As soon as switch 15 is closed, the downward progress of pawls 10 and 18 and lever 11 will be impeded and stopped.

The closure of switch 15 results in the closing of both sets of its contacts. The lower set of contacts of switch 15 close a short-circuit which has the effect of shunting special relay 6 out of the loop circuit so that relay 6 will not be affected by subsequent openings and closures of the loop. This need not necessarily be done, but it is advisable in order to save wear and tear on relay 6 and spring 16. The top set of contacts of switch 15 close a path leading from power supply 13, through motor 14, and then back to power supply 13. This will render power supply 13 operative and will start motor 14. Communication between central office 2 and station 1 may now take place.

When communication between central office 2 and station 1 has terminated and the operator at central office 2 wishes to make power supply 13 inoperative in order to stop motor 14 at station 1, she transmits a preassigned signal on her printing telegraph set such as upper case H. The reception by station 1 of the preassigned signal will cause contact 26 at station 1 to be momentarily closed by some such means as an upward push of pull bar 27 by the function bail (not shown) of the printing telegraph apparatus at station 1.

The closing of contact 26 closes a path leading from power supply 13, through contact 26, through relay 28, and then back to power supply 13. This will energize relay 28, and, since the force of the attraction of relay 28 is greater than the pull exerted by spring 25, lever 11 will be pulled up into its elevated position. When lever 11 is pulled up, switch 15 will open allowing its double set of contacts to open. The top set of contacts of switch 15 will open the path from power supply 13 through motor 14. This will cause power supply 13 to become inoperative and will cause the non-operation of motor 14. The bottom set of contacts of switch 15 will open the short-circuit across relay 6. Since the loop is normally closed, relay 6 will accordingly be energized and pull its armature 7 over to the right. Lever 11, when it is pulled up by relay 28, also pushes pawls 10 and 18 up into their normal position as shown in the drawing. Since spring rollers 12 and 23 are flexible, pawls 10 and 18 may be spread apart in order to allow projection 8 of armature 7 to go down and engage with tooth 9 of pawl 10. The circuit and apparatus is now restored to its normal unoperated condition as shown in the drawing.

Pawls 10 and 18 have shown to be pivotally attached to lever 11, to be drawn together by spring 29, and to be kept apart by stop 30. The invention is not limited to this particular construction but includes any other suitable arrangement. In fact, it is to be understood that the arrangements shown in the drawing and described above are illustrative of the operation of the invention and are given in order to serve to assist in interpreting the claims. The claims are not to be restricted to the precise construction described above, but are intended to include all changes and modifications within their scope

which employ the principles and features of operation of the invention.

What is claimed is:

1. A communication system having a near and
5 a remote station interconnected by a transmission line, the remote station having a motor and a normally inoperative source of power supply for operating the motor, said system having a remote control arrangement for rendering the
10 normally inoperative source of power supply operative and for starting the motor at the remote station in response to the reception of preassigned signal impulses transmitted by the near station over the transmission line, instrumentalities for
15 reducing the amount of false operation of the remote control arrangement caused by external disturbances affecting the transmission line, and apparatus for disconnecting the source of power supply from the motor after having been connected thereto, said apparatus being operated in
20 response to the reception at the remote station of a preassigned disconnect signal transmitted from the near station.

2. A printing telegraph system having a near
25 and a remote printing telegraph station interconnected by a telegraph line, the remote station having a motor and a normally inoperative source of power supply for operating the motor, said system having a remote control arrangement
30 for rendering the normally inoperative source of power supply operative and for starting the motor at the remote station in response to a plurality of successive openings and closures of the telegraph line by an operator at the near
35 station, instrumentalities for reducing the amount of false operation of the remote control arrangement caused by external disturbances affecting the transmission line, and apparatus for disconnecting the source of power supply from
40 the motor after having been connected thereto, said apparatus being operated in response to the reception at the remote station of a preassigned disconnect signal transmitted by an operator at the near station.

3. A communication system having a central
45 office connected by a normally closed loop to a subscriber's station having a motor and a source of power supply normally disconnected from the motor, said system having a remote control arrangement for starting the motor by connecting
50 the source of power supply to the motor, said remote control arrangement including both mechanical and electrical instrumentalities for reducing the amount of its false operation by accidental openings of the loop, and apparatus for
55 disconnecting the source of power supply from the motor after having been connected thereto, said apparatus being operated in response to the reception at the subscriber's station of a preassigned disconnect signal transmitted by an operator at the central office.

4. A printing telegraph system having a first
65 printing telegraph station connected by a telegraph line to a second printing telegraph station having a motor and a source of power supply normally disconnected from the motor, said system having a remote control arrangement for starting the motor connecting the source of power supply to the motor, said remote control arrangement comprising instrumentalities for reducing
70 the amount of its false operation, said instrumentalities including a relay and a pawl located at the second station, and apparatus for disconnecting the source of power supply from

the motor after having been connected thereto, said apparatus being operated in response to the reception at the second station of a preassigned disconnect signal transmitted from the first station.

5. A printing telegraph system having a near
80 printing telegraph station connected by a transmission line to a remote printing telegraph station having a motor and a source of power supply normally disconnected from the motor, said system having a remote control arrangement for
85 connecting the source of power supply to the motor, said remote control arrangement comprising instrumentalities for reducing the amount of its false operation, said instrumentalities including
90 a pawl, a contact, and a lever located at the remote station, and apparatus for disconnecting the source of power supply from the motor after having been connected thereto, said apparatus being
95 operated in response to the reception at the remote station of a preassigned disconnect signal transmitted from the near station.

6. A communication system having a near station connected by a transmission line to a remote
100 station having a motor and a source of power supply normally disconnected from the motor, said system having a remote control arrangement for connecting the source of power supply to the motor in response to successive openings and closures
105 of the line by an operator at the near station a preassigned number of times, said remote control arrangement including instrumentalities for disconnecting the source of power supply from the motor after having been connected thereto, said instrumentalities being operated in response
110 to the reception at the remote station of a preassigned disconnect signal transmitted from the near station.

7. A printing telegraph system having a first
115 printing telegraph station connected by a telegraph line to a second printing telegraph station having a motor and a source of power supply normally disconnected from the motor, said system having a remote control arrangement for
120 connecting the source of power supply to the motor in response to a plurality of successive openings and closures of the line by an operator at the first station, and instrumentalities for disconnecting the source of power supply from the motor after having been connected thereto, said
125 instrumentalities including a relay located at the second station, said relay being operated in response to the reception at the second station of a preassigned disconnect signal transmitted from the first station.

8. A printing telegraph system having a central
130 printing telegraph office connected by a telegraph line to a subscriber's printing telegraph station having a motor and a source of power supply normally disconnected from the motor, said system having a remote control arrangement for
135 connecting the source of power supply to the motor in response to successive openings and closures of the line by an operator at the central office a preassigned number of times, and instrumentalities for disconnecting the source of power supply from the motor after having been connected thereto, said instrumentalities being operated
140 in response to the reception at the subscriber's station of a preassigned disconnect signal transmitted by an operator at the central office.

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