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CONTROL OF DRIVING MOTORS OF TELEPRINTERS

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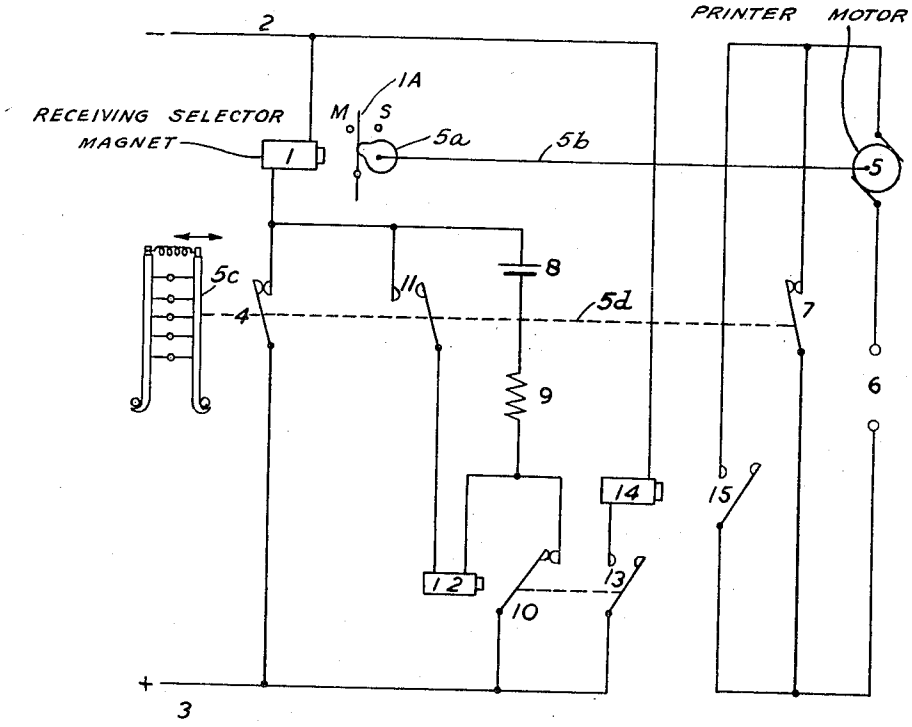

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CONTROL OF DRIVING MOTORS OF TELEPRINTERS

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The present invention relates to the control of driving motors of teleprinters having a receiving relay, the armature of which is presented at timed intervals to the electro-magnet cores by mechanical motion derived from the machine.

This type of electromagnet will properly respond to signals weaker than those necessary to operate the type which relies solely upon magnetic attraction to move the armature.

In teleprinters of the start-stop type it is usual to arrange that the receiving, translating and printing mechanism of the receiving printer be connected to a continuously running motor-driven shaft upon receipt of a "start" element. In the case of single current working this "start" element consists in effect of a break in transmission lasting one signal element, the normal condition of "rest" between transmissions being marked by the existence of current on the line.

It may not always be desirable to maintain current on the line during a period of non-transmission nor to maintain the motor of the receiving printer running during this period. The stopping of the motor may be controlled from the distant end by, for example, the transmission of a characteristic signal combination, the actual disconnecting of the motor being performed by a function member moved only in response to the receipt of the characteristic "motor stop" signal combination over the line.

When it is desired to re-open communication after both the motor circuit and the line have been opened, it is of course necessary to re-start the motor and this may be done in certain circumstances automatically by the movement of the armature of the receiving relay into the energised position on restoration of line current. With the type of printer with which this invention is concerned, this method is not possible since once the armature has been released no mechanical energy is available to move it into operating proximity of its winding until after the motor has started.

According to the present invention there are provided arrangements for controlling the motor of a teleprinter having a receiving relay associated with a telegraph line together with means under the control of said motor for rendering said relay responsive to signals received over said line, the said arrangements comprising means operable independently of said relay for automatically re-starting said motor as soon as current is restored on said line after removal therefrom for an indefinite period.

The invention will be better understood from the following description taken in conjunction

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with the accompanying drawing, which shows one embodiment thereof. Referring to the drawing, there is shown the electrical circuit of a teleprinter equipped with motor-controlling arrangements according to the present invention.

In the condition shown it is assumed that the machine is receiving transmissions from the distant end. In this condition, receiving selector magnet 1 is connected directly across lines 2 and 3 through contacts 4. The receiving magnet has an armature 1a associated therewith of the mechanically assisted type already described. Printer motor 5 is supplied from a suitable source at terminals 6 through contacts 7. Contacts 4 and 7 are mechanically coupled as shown. Cam 5a is driven by the motor 5 via the shaft 5b and the battery urges armature 1a in proximity with the magnet 1 so that weak signalling currents received over the line may draw the armature to operating position.

When the operator at the transmitting end has finished the transmission of intelligence and wishes to stop the motor 5 of the receiving machine, he sends the "figure-shift" combination followed by the appropriate "motor-stop" combination which may, for example, be the upper case of the letter "H." As a result, a function member 5c diagrammatically shown and which at the receiving end moves the link 5d by means of which contacts 4 and 7 are coupled and thus opens the motor circuit at contacts 7. Such a function member may be of the type disclosed in the copending application of R. D. Salmon filed March 11, 1948, and bearing Serial No. 14,177. Contacts 4 open at the same time to remove a short circuit from a circuit comprising a battery 8, a resistor 9 and contacts 10. The relative polarity of battery 8 and the value of resistor 9 are so chosen that the voltage drop across the resistor due to the passage of line current therethrough is completely off-set by the voltage delivered by the battery in opposition to the line voltage. Although the necessary source of potential has been represented by battery 8, it is to be understood that the same purpose would be served by any other form of direct current supply such as a rectifier connected to a source of alternating current.

Mechanically coupled to contacts 4 and 7 are a third pair of contacts 11. These are arranged to close when the other two open and in closing they connect a relay coil 12 across battery 8 and resistor 9. As there is no potential difference across this part of the circuit when the line current is flowing, relay 12 remains de-energised.

The motor having now been stopped, the line current may be switched off. This means that there is now a potential difference across relay 12 due to the fact that there is no line voltage to oppose the potential of the battery 8 and relay 12 is therefore energised. It opens contacts 10, thus breaking its own connection with line 3, and simultaneously closes a second pair of contacts 13, thus connecting another relay coil 14 across lines 2 and 3. Although contacts 10 and 13 have been shown as two pairs of contacts mechanically coupled it will be appreciated that they may conveniently be replaced by a single change over contact member connected to line 3 moving between fixed contacts respectively connected to relay coils 12 and 14.

The interruption of line current also causes receiving relay 1 to release its armature.

On the restoration of line current, relay 14 is energised and closes contacts 15 thus re-connecting motor 5 to the supply at 6.

When the armature of the receiving relay was released as a result of breaking the line current, the effect produced was that of the "start" element preceding any signal combination. Consequently when the motor starts, the armature of the receiving magnet is moved mechanically in proximity to the receiving relay magnet 1 as in the case of receipt of a normal signal combination. Since there is now no complete circuit through the coil relay magnet 1 due to the opening of contacts 10, the armature is released each time it is presented and the effect is that of receiving an "all space" signal combination. Since this combination differs from the "motor stop" combination last sent, the "motor stop" function member 5b is pushed out at the end of the revolution and as it moves it restores contacts 4, 7, and 11 to the positions they hold in the drawing. Contacts 4 complete the circuit for the receiving relay, contacts 7 provide another closure for the motor circuit and contacts 11 break the retaining circuit for relay 12. Contacts 10 are thereby closed to reconnect the battery and resistor circuit to line 3 and contacts 13 are opened to de-energise the relay coil 14. In consequence, contacts 15 open and the circuit is restored to the condition shown in the drawing. Since the operating circuit for the receiving relay was not closed until after the armature had been moved mechanically for the last time, the armature is still in the de-energised position at the end of the revolution. Consequently the clutch mechanism is operated again and the mechanism goes through a second cycle of events. Since the time taken for a cycle is so small, it can be safely assumed that current remains on the line during the first two cycles. As soon as the armature is presented in proximity to the pole piece of the receiving relay this time, it is retained there. The effect produced is that of an "all mark" signal. Since this is the "letter shift" signal, the effect of the "figure shift" signal which of necessity preceded the "motor stop" signal is cancelled. At the end of the revolution the armature is still held by the receiving relay and further revolutions of the receiving and translating mechanism are thus prevented until the receipt of the start element preceding the first signal combination.

It is not necessary to switch off the line current for a long period in order to initiate the re-starting of the motor in the manner described. an interruption lasting a tenth of a second being sufficient for this purpose. Accordingly, if the motor were switched off but current maintained on the line, the operation of a push-button or similar device in the line circuit at the transmitting end would cause all the above events to take place in rapid succession thus bringing the receiving teleprinter once more into a condition to receive further transmissions.

While the principles of the invention have been described above in connection with specific embodiments and particular modifications thereof, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the invention.

What is claimed is:

1. A circuit for remotely controlling a teleprinter motor over a signal current path comprising a receiving magnet having an armature associated therewith, means coupled to said motor for mechanically assisting said armature, a function member actuable under control of said armature upon receipt by said magnet of a characteristic code signal combination over said path, said signal combination preceding a change in current condition on said path, a plurality of contacts coupled to said function member, a first of said contacts adapted to normally connect said motor to a source of power, a second of said contacts adapted to normally connect said receiving magnet to said receiving path, counter-potential means in shunt with said second contact, a first relay serially connected between a third of said contacts and said counter-potential means, said first relay adapted to operate upon removal of current from said path after said function member has been actuated and said second contact has been opened and said third contact is closed, a second relay serially connected between said line and an additional contact associated with said first relay, a further contact associated with said second relay adapted to re-connect said motor to a source of power to restart said motor when said second relay is energized by signalling currents received over said path after said function member has been actuated, said armature adapted to control the return of said function member to its unactuated position to re-cycle said circuit.

2. A circuit for remotely controlling a teleprinter motor as claimed in claim 1, further comprising an auxiliary contact associated with said first relay serially disposed between said counterpotential means and said path, said contact adapted to disconnect said counterpotential means when said first relay is energized.

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