

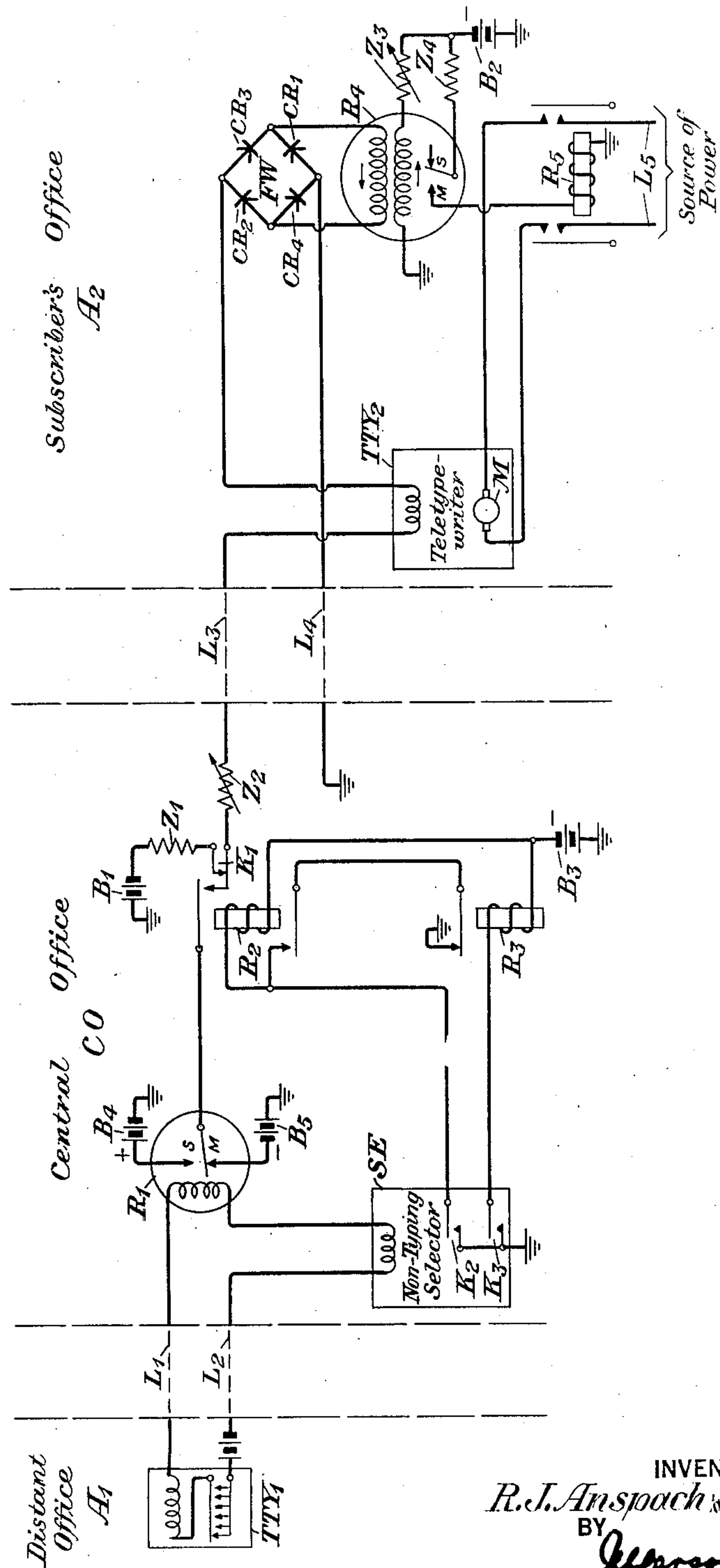
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TELETYPEWRITER CONTROL SYSTEM

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TELETYPEWRITER CONTROL SYSTEM

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This invention relates to electrical control systems. More particularly this invention relates to telegraph and teletypewriter signaling systems and to arrangements for the control of motor and other apparatus which may be employed in such systems.

In prior teletypewriter systems, for example, in which a plurality of stations are interconnected so that any one of the stations may transmit signals to any one or more of the other stations, it has been the practice to operate the motors of the teletypewriter equipment at all stations which are connected to the circuit even though but one of the stations is expected to receive the signals. Although the teletypewriter at one of the stations is alone receiving the signals, the motors at all of the other teletypewriter stations connected to the system are run continuously. This involves a wastage of power, an unnecessary deterioration of the operating parts of the motors and other allied equipment, and at the same time produces considerable noise.

In order to overcome the difficulties of prior art systems it is proposed to interconnect two or more stations for the transmission of teletypewriter (or like) signals so that the motor at any receiving station will be operated only when signals are to be transmitted to that station. In accordance with one embodiment of the invention to be described hereinafter a predetermined signal will be transmitted in order to cause the source of power to be connected to the motor at a receiving teletypewriter station and the system is arranged so that the motor at the receiving station will remain in operation until a subsequent signal is transmitted to cause its disconnection from its source of power. The signal pulses themselves will be employed to maintain the motor apparatus in operation.

In the specific embodiment of the invention to be described hereinafter, two stations may be interconnected for the transmission of signals from one of the stations to the other station and the receiving station will include a relay connected to the receiving loop through a full-wave rectifier, the relay controlling the connection of the motor of the associated teletypewriter apparatus to the power source. The full-wave rectifier will be employed to convert the pulses characteristic of teletypewriter signals into unidirectional or non-pulsating currents which will flow through the relay winding and act to maintain the motor of the receiving teletypewriter connected to its source of power. The relay will remain operated as long as either of the two oppositely poled po-

tentials are applied to the telegraph loop. This will be explained in greater detail hereinafter.

This invention will be better understood from the more detailed description hereinafter following, when read in connection with the accompanying drawing showing one embodiment of the invention merely for the purpose of illustration.

Referring to the drawing, there is illustrated part of the equipment for the transmission of signals between a distant office A₁ and a subscriber's office A₂, the two offices being interconnected through a central office CO. The teletypewriter TTY₁ of the distant office A₁ is connected over line L₁, L₂ to the winding of the relay R₁ and a non-typing selector SE of well-known type. The non-typing selector SE will be employed to control two relays R₂ and R₃, the relay R₂ being used to connect the armature of the relay R₁ to the subscriber's loop L₃, L₄ to repeat the signals to the subscriber's loop, and the relay R₃ employed to disconnect the armature of relay R₁ from the subscriber's loop L₃, L₄ when signaling is to be terminated. The subscriber's office A₂ includes a teletypewriter TTY₂, a full-wave rectifier FW and a relay R₄, the relay R₄ being operated when signals are to be received from office A₁ and to remain operated only until the last signal has been received from that office. The relay R₄ will control another relay R₅ so as to connect the source of power L₅ to the motor M of the teletypewriter TTY₂.

When no signals are being transmitted from the distant office A₁ to the central office CO over the line L₁, L₂, the apparatus at the central office will be in the condition shown in the drawing. The battery B₁ will be connected over the subscriber's loop L₃, L₄ to the upper winding of relay R₄ through the rectifier FW, the interconnecting circuit including battery B₁, resistor Z₁, normal contact K₁ of relay R₂, resistor Z₂, conductor L₃, teletypewriter TTY₂, rectifier element CR₂, upper winding of relay R₄, rectifier element CR₁, conductor L₄ and ground. The current traversing the upper winding of relay R₄ will be of a reduced magnitude as, for example, 10 mils., but this current through the upper winding will be insufficient to overcome the opposing effect produced by the lower or biasing winding of relay R₄ which continuously carries a heavier current of, for example, 20 mils. The biasing winding circuit includes, in addition to the lower winding of relay R₄, the resistor Z₃, the battery B₂ and ground. Under these conditions the armature of relay R₄ will be on its contact S as shown, and relay R₅ will be unoperated. The source of power L₅, which is

controlled by relay R₅, will therefore be disconnected from the motor M of the teletypewriter TTY₂.

If a predetermined signal or signals are transmitted from the teletypewriter TTY₁ of the distant office A₁, over the line L₁, L₂, the contact K₂ will be closed momentarily in response to the predetermined signal or signals. A signal that may be used for this purpose is, for example, "Figs A" or "Figs A" followed by "Letters." The momentary closure of contact K₂ will cause relay R₂ to be operated, the operating circuit including contact K₂, the winding of relay R₂, battery B₃ and ground. Relay R₂ will then be locked in its operated position, the locking circuit including battery B₃, the winding of relay R₂, the lower armature and make contact of relay R₂, the armature and back contact of relay R₃ and ground. In response to the operation of relay R₂, the armature of relay R₁ will be connected to the conductor L₃ of the subscriber's loop, the connection being completed through the upper armature of relay R₂ and the make-before-break contact associated therewith. Inasmuch as the winding of relay R₁ receives all signals transmitted from the teletypewriter TTY₁ of the distant office A₁, its armature will move between its M and S contacts in response to these signals so as to connect oppositely poled batteries B₄ and B₅ alternately to the conductor L₃ of the subscriber's loop through the upper armature of relay R₂ and its make contact. The signals will then be received and recorded by the subscriber's teletypewriter TTY₂ provided its motor M is in operation.

The motor M of the teletypewriter TTY₂ at the subscriber's office A₂ will be connected to its source of power L₅ upon the operation of relay R₂ as will now be explained. In response to the operation of relay R₂ the battery B₅ will be connected to the subscriber's loop L₃, L₄ over a circuit which includes battery B₅, the armature and marking contact M of relay R₁, the upper armature and make contact of relay R₂, resistor Z₂, conductor L₃, teletypewriter TTY₂, rectifier element CR₂, the upper winding of relay R₄, rectifier element CR₁, conductor L₄ and ground. The resistor Z₂ is of a considerably smaller magnitude than resistor Z₁ so that the current now traversing the upper winding of relay R₄ will be of a substantially increased magnitude as, for example, 30 mils. The effect of this current flowing through the upper winding of relay R₄ will be sufficient to overcome the opposing effect of the lower or biasing winding of relay R₄ and thereby cause the armature of relay R₄ to close its contact M. When this happens, relay R₅ will be operated, the operating circuit including battery B₂, resistor Z₄, the armature and contact M of relay R₄, the winding of relay R₅ and ground. Relay R₅ will then connect the source of power L₅ to the motor M and cause it to operate the teletypewriter TTY₂ so that signals from the distant office A₁ may be received and recorded by the subscriber's teletypewriter TTY₂ in the usual manner.

When the relay R₁ receives a spacing signal, for example, from the teletypewriter TTY₁ of the distant office A₁, battery B₄, which is of a polarity opposite to that of battery B₅, will be connected to the conductor L₃ and to the upper winding of relay R₄ over a circuit which includes battery B₄, the armature and spacing contact S of relay R₁, the upper armature and make contact of relay R₂, resistor Z₂, conductor L₃, tele-

typewriter TTY₂, rectifier element CR₃, the upper winding of relay R₄, rectifier element CR₄, conductor L₄ and ground. The rectifier elements CR₃ and CR₄ are so poled as to cause the current supplied by battery B₄ to traverse the upper winding of relay R₄ in the same direction as will current from battery B₅. Consequently relay R₄ will remain operated when the armature of relay R₁ is on its spacing contact S. Hence relay R₅ will remain operated and maintain the source of power L₅ connected to the motor M of the subscriber's teletypewriter TTY₂.

It will be observed, therefore, that as signals are received by the relay R₁ from the distant teletypewriter TTY₁, the connection of oppositely poled batteries to the subscriber's loop L₃, L₄ will cause current to traverse the upper or operating winding of relay R₄ in the same direction practically continuously and therefore maintain relay R₄ operated. The travel time of the armature of polar relay R₁ will be insufficient to allow relay R₄ to release. Relay R₄ will therefore remain operated as long as relay R₂ remains operated. Relay R₅ will likewise remain operated as long as relay R₂ remains operated. Thus the motor M will be maintained in its operated condition as long as relay R₂ remains operated. The connection of the full-wave rectifier FW in circuit of the relay R₄ to maintain the motor M in operated condition as long as the distant office A₁ and the subscriber's office A₂ are interconnected for the transmission of signals, represents a primary feature of this arrangement.

When the transmission of signals from the distant teletypewriter TTY₁ to the subscriber's teletypewriter TTY₂ is to be terminated, another predetermined signal or signals will be transmitted over the line L₁, L₂. This signal, which may be, for example, "Figs H," will cause a momentary closure of contact K₃. When contact K₃ is closed, relay R₃ is operated over a circuit which includes battery B₃, the winding of relay R₃, contact K₃ and ground. The operation of relay R₃ will open the locking circuit for relay R₂ theretofore provided by the back contact of the armature of relay R₃, and hence relay R₂ will become released. Upon the release of relay R₂ battery B₁ will then be reconnected to the subscriber's loop conductor L₃ as shown in the drawing and as already described. The current supplied by battery B₁ to the upper winding of relay R₄ through the full-wave rectifier will now be of reduced magnitude due to the presence of both resistors Z₁ and Z₂ in the interconnecting circuit. In that case the armature of relay R₄ will return to its contact S, causing relay R₅ to release. Relay R₅ will then disconnect the motor M from the source of power L₅.

It is noted that the predetermined signal or signals to be employed for interconnecting the distant and subscriber's offices A₁ and A₂ may be, for example, a character such as "Figs A," or any series of characters such as "Figs A" followed by "Letters," etc. It is important to provide a pause after the contact K₂ is closed to operate relays R₂, R₄ and R₅ and allow the motor M at the subscriber's office to reach its required speed. This is important in that the receiving teletypewriter TTY₂ is caused thereby to operate in synchronism with the transmitting teletypewriter TTY₁ even in reproducing and recording the first signal of the message. The predetermined starting signals transmitted to the apparatus of this invention are intended to cause the tele-

typewriter TTY₂ to receive signals only after the motor M has reached its rated speed.

It is noted that the offices A₁ and A₂ are shown interconnected so that signals may be transmitted from the office A₁ and received by the office A₂. The equipment for the transmission of signals from office A₂ to office A₁ has been omitted merely to simplify the disclosure and illustrate only the apparatus necessary to understand the invention. It will be clear, however, that apparatus for the two-way transmission of signals between two or more offices is clearly contemplated and that the additional equipment for this purpose which is of well-known type need not be described.

The distant office A₁ is shown connected to but one subscriber's office A₂. Additional offices may be connected to the circuit in any well-known manner. For example, another office having a repeating relay such as R₁ and a non-typing selector such as SE, may be connected in series with line L₁, L₂ so that all of the offices will be connected to the same circuit. If so desired, different predetermined characters may be employed to start or stop the motors of the teletypewriters at the different offices, as will be understood by those skilled in the art.

The magnitude of the currents and the types of characters or signals that may be used in the operation of the equipment of this invention have been given merely for illustrative purposes. It will be understood that the system may be designed to operate with other current values and other characters or signals widely different from those referred to without departing from the spirit of the invention. Moreover, the invention may be readily applied to telegraph systems or to any system in which oppositely poled currents or voltages are employed for signaling. The primary objective of the invention is the maintenance of the operation of receiving equipment while the polarity of the current or voltage is undergoing rapid changes. The invention may be employed wherever pulses of current are transmitted and it will serve to control the operation of equipment at the receiving point.

While this invention has been shown and described in certain embodiments merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. In a teletypewriter system, the combination of a first teletypewriter, a full wave rectifier, a second teletypewriter having a winding in series with said rectifier and a motor to control the operation of said second teletypewriter, a biased relay connected to said rectifier to control the operation of said motor, an impedance element connected to said winding and said rectifier so as to reduce any current traversing the relay below the value required for its operation, and means responsive to a predetermined signal to disconnect said impedance element from the circuit of said winding and said rectifier, said latter means including means to enable said first teletypewriter

to produce oppositely poled pulses according to teletypewriter signals to be transmitted to the winding of said second teletypewriter and said rectifier, said relay being continuously operated by said oppositely poled pulses traversing said rectifier.

2. In a teletypewriter system, the combination of a first teletypewriter, a second teletypewriter for receiving signals from said first teletypewriter, said second teletypewriter having a winding and a motor, an impedance element, a full wave rectifier, a biased relay having its winding connected in circuit with said rectifier, said impedance element and said winding, said impedance element being of such a magnitude that currents traversing said relay will be insufficient to operate it, means responsive to a predetermined signal from said first teletypewriter to disconnect said impedance element from said circuit to enable oppositely poled pulses corresponding to signals from said first teletypewriter to be transmitted to the winding of the second teletypewriter, and means responsive to said predetermined signal to continuously operate said relay, said relay controlling the operation of the motor of said second teletypewriter.

3. In a teletypewriter system, the combination of a first teletypewriter, a second teletypewriter having a winding and a motor, an impedance element, a full wave rectifier, a biased relay connected to said rectifier, a source of current connected through said impedance element to said winding and said rectifier, the magnitude of the latter current being insufficient to operate said relay, means controlled by said relay to operate said motor, means responsive to a predetermined signal to disconnect said source of current and said impedance element from said winding and said rectifier, said latter means including means for applying oppositely poled sources of current in accordance with signals from said first teletypewriter to operate said relay continuously.

4. In a teletypewriter system, the combination of a first teletypewriter, a second teletypewriter having a winding and a motor, an impedance element, a full wave rectifier, a biased relay connected to said rectifier, a source of current connected in circuit with said impedance element and said winding and rectifier, the magnitude of the latter current being insufficient to operate the relay connected to said rectifier, means controlled by said relay to operate said motor, means responsive to a first predetermined signal from said first teletypewriter to disconnect said source of current and said impedance element from said circuit, said latter means including means responsive to teletypewriter signals from said first teletypewriter for alternately applying oppositely poled sources of current through said winding to said rectifier so as to continuously operate the relay connected to said rectifier, and means responsive to a second predetermined signal to reconnect said source of current and said impedance element to said circuit to release said relay.

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