

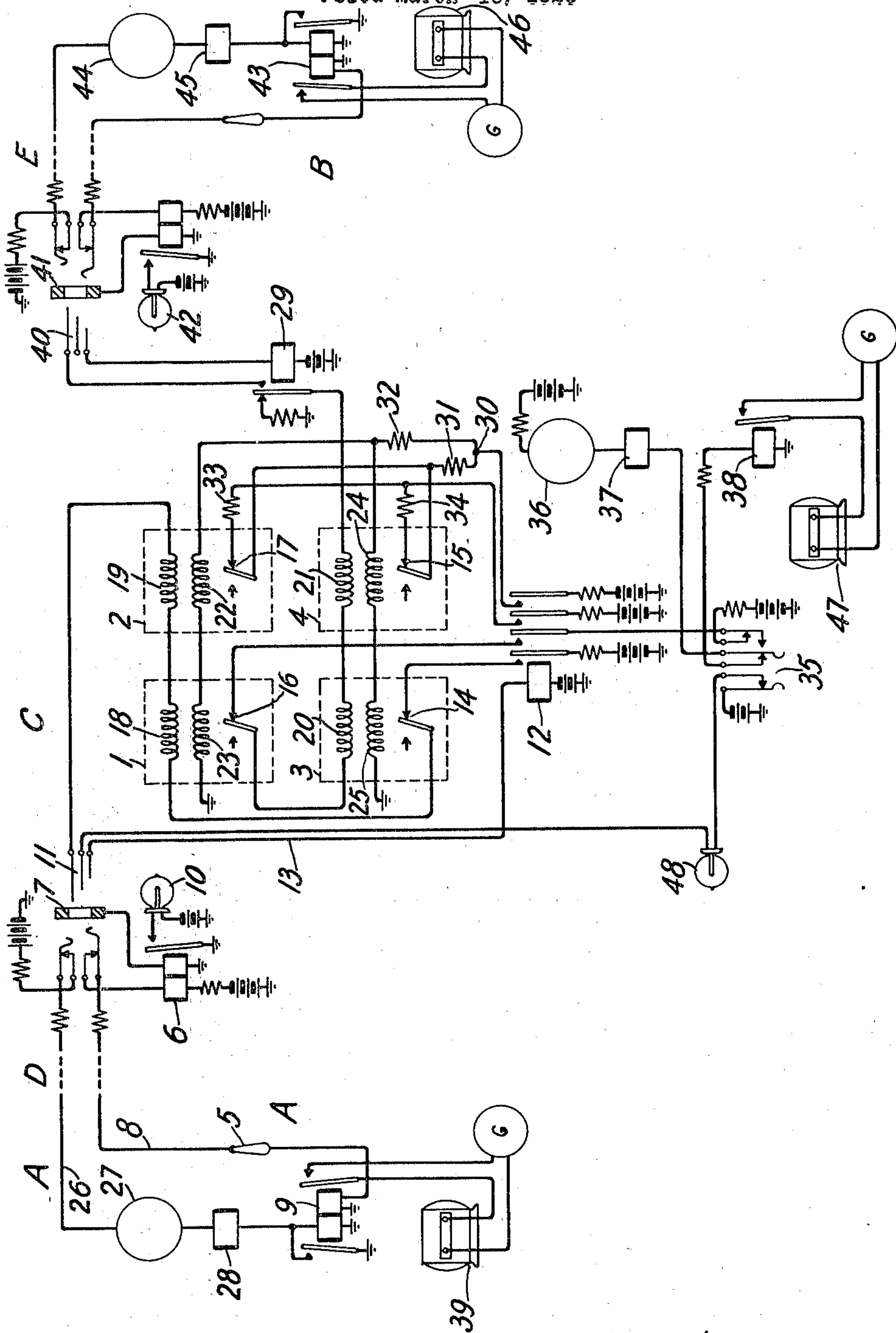
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PRINTING TELEGRAPH SYSTEM

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UNITED STATES PATENT OFFICE.

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PRINTING-TELEGRAPH SYSTEM.

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This invention relates to printing telegraph exchange systems, and more especially to such of those systems wherein the power supply at the subscribers' stations is controlled from a distant central office.

The object of this invention is to reduce to a minimum the current required and the maintenance expense incurred in the operation of a printing telegraph system which may be employed to interconnect, through a central office, stations requiring light duty service, particularly, those stations whereat printing sets are idle for a considerable part of the time during which it is desired to have no parts in motion.

In accordance with this invention, the motors at the calling and called stations are not started until a set of impulses constituting a character, is received from the operator at a central switching station.

The above and other features of this invention are set forth in the following description and appended claims, and may be more readily understood when the description is taken in conjunction with the accompanying drawing which illustrates this invention. In the drawing there is shown a complete telegraph printing system consisting of a central office with two subscriber's stations with only that apparatus necessary for a clear understanding of the invention.

Referring now to the drawing, there are shown two printing telegraph subscriber's stations, A and B, having telegraph lines, D and E, respectively, connecting the stations with a central switching station C. It will be understood, of course, that in actual practice many other lines, similar to D and E, may terminate at the same central station and that a plurality of link, or cord circuits, similar to the one shown, are employed. Each of the link circuits is arranged with a polar relay repeater consisting of relays 1, 2, 3 and 4 for repeating directly the impulses received from one line to another with which it is associated through the link circuit. For a more complete understanding of the operation of the repeater, reference is made to the patent to J. M. Fell No. 1,479,430, issued January 1, 1924. Lines D and E each consists of the usual pair of wires, one wire with a ground return being used for the transmission of the message impulses, and the other being available for con-

trol and signaling. In this arrangement the power supply at the subscribers' stations is under the control of the operator at the central station.

Assume for the sake of illustration that the subscriber A desires to communicate telegraphically with subscriber B. The subscriber A would thereupon actuate locking switch 5, which opens a normally closed circuit extending from grounded battery, through the left-hand winding of line relay 6, ring contact of jack 7, control wire 8 of line D, switch 5 (normally closed), through the right-hand winding of control relay 9 to ground. Relay 6 deenergizes and releases its armature to close an obvious energizing circuit for the line lamp 10. Line lamp 10 is thereupon lighted for indicating to the operator that subscriber A desires to be connected with another subscriber.

The operator at the central station, in observing the lighted condition of lamp 10, inserts answering plug 11 in jack 7, whereupon the energizing circuit of the lamp is opened by the re-energization of relay 6. The circuit for the re-energization of relay 6 may be traced from grounded battery, through the winding of relay 12, conductor 13, sleeve of jack 7, through the right-hand winding of relay 6 to ground. In the latter circuit relay 12 operates to close a circuit extending from grounded battery, innermost contact of relay 12, contact 14, line windings 18 and 19, respectively, of relays 1 and 2, tip contact of jack 7, wire 26 of line D, transmitter 27, through the winding of printer magnet 28, through the left-hand winding of control relay 9, to ground, to hold relay 9 in an operated condition, this relay having previously operated, until it is desirable to start the motor at station A. Relay 12, in operating, closes at the next to its innermost contact a circuit extending from grounded battery at the outer right normal contact of key 35, contact of relay 12, contact 16 of relay 1, line windings 20 and 21, respectively, of relays 3 and 4, to ground at the armature of relay 29. Also, at the outermost contact of relay 12 an obvious circuit is closed for energizing the local windings 22 and 23, respectively, of relays 2 and 1, and local windings 24 and 25, respectively, of relays 4 and 3. The circuit for energizing these local windings

also extends over a parallel path through the contacts 15 and 17 in parallel, through the next to the outermost contact of relay 12 to battery of opposite polarity. For the purpose of regulating the currents passing through the local windings 22, 23, 24 and 25, a comparatively high resistance is employed in each of the parallel paths, and in one of these paths, that is, the one extending over contacts 15 and 17 in parallel, a low resistance is employed at each of the contacts. During the time that the plug 11 is in jack 7, and no message signals are being transmitted, the current conditions in the line and the local windings of the repeater are such as to maintain the contacts 14, 15, 16 and 17 in closed positions, and it is only when the current passing through the line windings is varied or stopped by the operation of a transmitter at the sending station that these contacts are opened. A more complete description of the operation of the repeater as hereinbefore stated may be found in the above mentioned Fell Patent No. 1,479,430.

The plug 11 having been inserted in jack 7, the operator is now in connection with subscriber A. The operator thereupon actuates a printer key 35 which connects the operator's printing telegraph equipment to the selected link. The operation of key 35 opens a normally closed circuit extending from grounded battery at the operator's transmitter 36, through the winding of printer magnet 37, inner right normal contact of the key, through the winding of control relay 38, to ground. Relay 38 deenergizes and the motor 47 for the operator's telegraph equipment is started.

The operator then transmits a character signal to the subscriber A, which effects the momentary opening of contact 14. When contact 14 is opened, the circuit extending through the left-hand winding of control relay 9 as hereinbefore traced, is deenergized. Inasmuch as the circuit extending through the right-hand winding of relay 9 is opened at switch 5, relay 9 releases its armatures and a circuit is closed at the right armature for starting the motor 39. In this manner the motor 39 at the subscriber's station is not started until the first character signal is transmitted by the operator. At the left armature of relay 9 a substitute ground is provided for preventing the subsequent energization of relay 9 when contact 14 closes during the transmission of message impulses.

Upon receiving the character signals from the operator, the subscriber A now operates transmitter 27 to send a character signal to the central station indicating to the operator that a connection is desired with line E extending to subscriber's station B. The operator, having ascertained the number of

the called line, inserts the calling plug 40 of the selected link in jack 41 for extending the line D to the line E. The insertion of the plug 40 in jack 41 causes the disconnection of line lamp 42 which is prevented from operating when subscriber B responds to the call, and closes an energizing circuit for relay 29 which operates to connect the line windings 20 and 21, respectively, of relays 3 and 4, with the tip conductor of plug 40.

The insertion of plug 40 in jack 41 also opens two normally closed circuits extending, respectively, through both windings of control relay 43, but this relay is maintained energized by the substitute battery supply at transmitter 36, the substitute circuit being traceable from transmitter 36, through the winding of magnet 37, off-normal contact of key 35, next to the innermost contact of relay 12, contact 16, line windings 20 and 21, respectively, of relays 3 and 4, front contact of relay 29, tip contact of jack 41, transmitter 44, through the winding of printer magnet 45, through the right-hand winding of relay 43, to ground.

The operator then transmits a character signal to subscriber B, and the last traced circuit is opened momentarily at transmitter 36, causing the deenergization of the right-hand winding of relay 43, and the relay releases. The release of relay 43 closes a circuit extending through the motor 46 at station B and the motor starts. The character signal transmitted to station B by the operator is also received by the subscriber at station A indicating to the subscriber at that station that he may proceed with the message.

The operator then restores the printer key 35, which transfers the battery supply at transmitter 36 from the line circuit extending to station B, to the circuit extending through the winding of relay 38. Relay 38 re-energizes, thereby opening the circuit extending through motor 47 and the motor stops. When the battery supply at transmitter 36 is removed from the line circuit, another battery supply is substituted at the make-before-break contact of key 35 to maintain the line circuit extending to station B, as hereinbefore traced, closed while awaiting the transmission of the message from station A. Key 35 when restored, connects battery at its left contact to prepare a circuit extending through supervisory lamp 48, over the ring contact of jack 7 and control wire 8 to the open switch 5. The transmitter at station A is now connected through a repeater at station C to the printing equipment at station B.

At the completion of the message the subscriber at station A restores switch 5 and the circuit which was prepared by the restoration of printer key 35, mentioned above,

is closed. This circuit may be traced from grounded battery, left contact of key 35, supervisory lamp 48, ring contact of jack 7, control wire 8, switch 5, right-hand winding of relay 9, to ground. Relay 9 operates and opens the energizing circuit for motor 39, thereby bringing the motor to a stop. The lamp 48 is lighted in this circuit and thereby informs the operator that the message is completed and that the answering and calling plugs may be removed from their respectively associated jacks. The removal of the plugs places the apparatus at the two subscribers' stations and that associated with the operator's link circuit which was employed in the connection, in normal condition.

What is claimed is:

1. A printing telegraph exchange system comprising a central station, a plurality of subscribers' stations, a plurality of telegraph subscribers' lines interconnecting said central station and said subscribers' stations, manually operable link circuits at said central station for interconnecting said subscribers' stations, means at each of said stations for transmitting and receiving impulses, and means at said central station for preventing the operation of the transmitting and receiving means at any of said subscribers' stations until the operation of the transmitting means at the central station.

2. A printing telegraph exchange system comprising a central station, a plurality of subscribers' stations, a plurality of lines interconnecting said central station and said subscribers' stations, manually operable link circuits at said central station for interconnecting said subscribers' stations, means at each of said stations for transmitting and receiving impulses, and individual motor means for driving each of said transmitting and receiving means, arranged to be normally idle, said motor means being under the control of the transmitting means at the central office.

3. A printing telegraph exchange system comprising a central station, a plurality of subscribers' stations, a plurality of lines interconnecting said central station and said subscribers' stations, manually operable link circuits at said central station for interconnecting said subscribers' stations, means at each of said stations for transmitting and receiving impulses, a plurality of signals at said central station, common means at each of said subscribers' stations for operating said signals, one signal being operated when a connection with one of said link circuits is desired and the other when said connection should be discontinued, an electrical motor for driving each of said transmitting and receiving means, arranged to be started by the operation of the transmitting means at said central station and arranged to be

stopped when said common signaling means is operated to discontinue said connection between the line and the link circuits.

4. A printing telegraph exchange system comprising a central station, a plurality of subscribers' stations, calling and called lines for connecting said central station with said subscribers' stations, manually operable links at said central station for interconnecting said calling and called lines, means at each of said stations for transmitting and receiving impulses, a plurality of signals at said central station, common means at subscribers' stations of each of said calling lines for operating said signals, one signal being operated when a connection with one of said link circuits is desired and the other when said connection should be discontinued, start-stop motor means associated with each of said transmitting and receiving means arranged to be normally idle, means at said central office for starting the motor thereat to drive its associated transmitting and receiving means, said transmitting means at the central office effecting the starting of the motors at the subscribers' stations of both the calling and called lines, and means at the central station for stopping the motor thereat when the subscribers at the stations of the calling and called lines are in intercommunication.

5. A printing telegraph exchange system comprising a central station, a plurality of subscribers' stations, calling and called lines for connecting said central station with said subscribers' stations, manually operable links at said central station for interconnecting said calling and called lines, means at each of said stations for transmitting and receiving impulses, a plurality of signals at said central station, common means at the subscribers' stations of each of said calling lines for operating said signals, one signal being operated when a connection with one of said link circuits is desired and the other when said connection should be discontinued, start-stop motor means associated with each of said transmitting and receiving means arranged to be normally idle, means at said central station for starting the motor thereat to drive its associated transmitting and receiving means, said transmitting means at the central office effecting the starting of the motors at the subscribers' stations of both the calling and called lines, and means at the central station for stopping the motor thereat when the subscribers at the stations of the calling and called lines are in intercommunication, the motors at the subscribers' stations of the calling and called lines being stopped at the completion of the intercommunication when said connection is discontinued upon the operation of the second mentioned signal.

6. A printing telegraph exchange system

- comprising a central station, a plurality of subscribers' stations, a plurality of telegraph subscribers' lines interconnecting said central station and said subscribers' stations, link circuits at said central station for inter-
5 connecting said subscribers' stations, a central office repeater for repeating signals from one line to another, means at each of said stations for transmitting and receiving character signals, and a motor at each of said
10 stations for driving said means, the motors at the subscribers' stations being arranged to be started when a character impulse is transmitted from the central station.
- 15 7. A printing telegraph exchange system comprising a central station, a plurality of subscribers' stations, a plurality of telegraph subscribers' lines interconnecting said central station and said subscribers' stations, link circuits at said central station for inter-
20 connecting said subscribers' stations, a polarized repeater in each of said link circuits for repeating signals from one line to another, means at each of said stations for transmitting and receiving character sig-
25 nals, and a motor at each of said stations for driving said means, the starting and stopping of the motors at the subscribers' stations being directly controlled from the central office.
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- In testimony whereof, I have signed my name to this specification this 13th day of March, 1926.
- GILBERT S. VERNAM.