

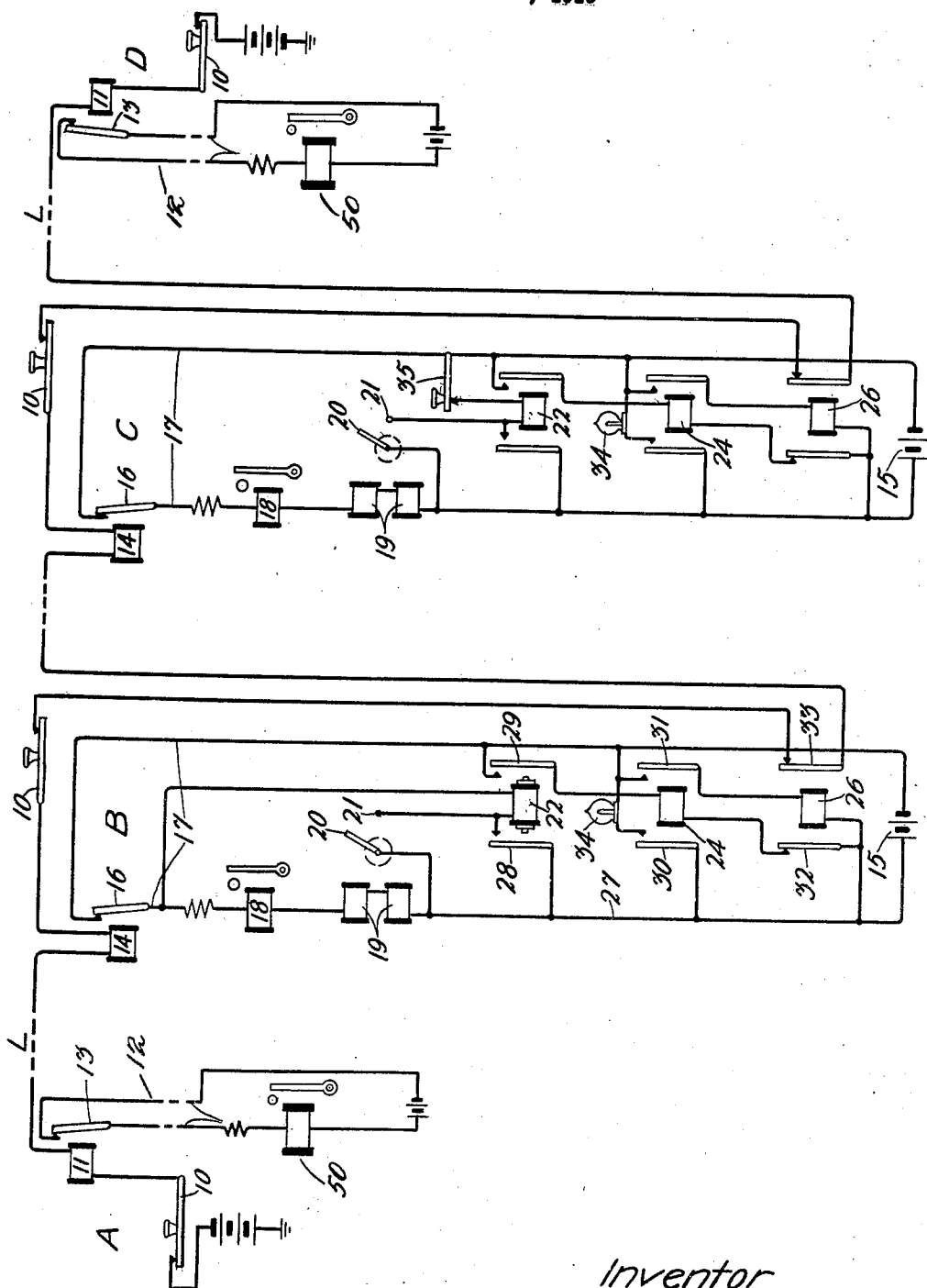
Nov. 1, 1927.

J. C. FIELD

SIGNALING SYSTEM

Filed Oct. 3, 1919

1,647,284



Inventor
Joseph C. Field
by Jas. E. Palmer Att'y

UNITED STATES PATENT OFFICE.

JOSEPH C. FIELD, OF ORANGE, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SIGNALING SYSTEM.

Application filed October 3, 1919. Serial No. 328,275.

This invention relates to signaling systems and particularly to improvements in telegraph signaling systems.

The principal object of this invention is to provide a simplified and an improved answer-back signaling means whereby an operator, upon signaling a distant station, may be automatically apprised of the receipt of the proper signal at the desired station.

A further object is to provide a system which is efficient and reliable in operation and one which requires a minimum number of operating parts.

For the accomplishment of the above objects, the invention contemplates the embodiment of a plurality of sending and receiving stations, with means at the sending stations to transmit code signals, and means at the receiving stations selectively responsive to the code signals, and additional means thereat to automatically signal back to the sending or originating station after receipt of the code signal. The selective responsive means at the receiving stations may comprise suitable code selectors responsive to predetermined groups of code impulses, and the answer-back equipment may comprise suitably timed electro-responsive devices for periodically opening and closing the line circuit. Each station may, if desired, be equipped with complete transmitting and receiving apparatus.

The above and other objects of this invention will be fully set forth in the following description and claims and will be more readily understood by reference to the accompanying drawing wherein the preferred embodiment of the invention is shown.

Referring to the drawing, A, B, C and D represent sending and receiving stations interconnected by a main line L. At stations A and D there is shown a telegraph key 10 for sending impulses over the line L, while at stations B and C there is shown in addition to the usual transmitting keys 10, receiving apparatus under the control of the line relays 14. The line relays 11 at stations A and D are each provided with an armature 13 for controlling a local circuit 12 in which may be included an ordinary telegraph receiving sounder 50.

It will be understood that the line circuit is normally closed through each key or through an auxiliary switch associated there-

with as is well understood in telegraph practice.

Referring particularly to the apparatus and circuits shown at stations B and C, each line relay 14 is provided with an armature 16 for controlling the apparatus connected in a local circuit 17, including local battery 15. Connected in the local circuit 17 is a telegraph sounder 18 which may be used for ordinary signaling purposes. In circuit with the sounder 18 is a selector switch magnet 19 for operating the selector switch arm 20. This selector is of the type shown in U. S. patent to Gill, No. 906,523, dated December 15, 1908, and is so constructed that the selector magnet 19 will not be operated by the Morse signals sent over the line for operating the sounder 18, but will only be operated when predetermined code impulses are transmitted to operate the selector switch magnet 19. Under control of the line relay 14 and selector switch magnet 19 are a plurality of chain connected relays 22, 24 and 26 for controlling the operation of a signaling device at the receiving station, and for sending an answer-back or series of impulses back to the sending or originating station to operate a suitable indicating device provided at such originating or sending station.

Assuming, for example, that the operator at station A desires to call or signal the operator at station B, the key at station A is operated to send to line L a series of code impulses which will advance the selector arm 20 at station B to engage contact 21 and close a local circuit through the winding of relay 22. While the selectors 19 at each of the stations connected to the line circuit will respond to the impulses sent out from station A, owing to the selective feature of the code employed only the selector switch at station B will advance sufficiently to engage the contact 21. The closing of the selector contact at station B completes an energizing circuit through relay 22, which may be traced from local battery 15, conductor 27, selector switch arm 20, contact 21, winding of relay 22, armature 16 of relay 14 and contact thereof, to the other side of local battery 15. Relay 22 upon being energized attracts its armatures 28 and 29, thereby establishing a holding circuit through relay 22 from battery 15, armature 28 and contact of relay 22, winding of relay 22, armature and contact of relay 14 to the other side of battery 15 and by the

attraction of armature 29 establishes an energizing circuit through relay 24 from local battery 15, armature 32 and back contact of relay 26, winding of relay 24, armature 29 and contact of relay 22, to the opposite side of battery 15. Relay 24 thereupon pulls up its armatures 30 and 31. The attraction of armature 30 establishes an operating circuit through a signaling device 34 from battery 15, armature 30 and front contact of relay 24, signaling device 34 to the other side of battery 15. The attraction of armature 31 establishes an energizing circuit through relay 26 from battery 15, winding of relay 26, armature 31 and back contact, of relay 24 to the other side of battery 15. Relay 26 thereupon pulls up its armatures 32 and 33. The attraction of armature 33 opens the line circuit L, which is normally closed through the armature and back contact of relay 26, and the attraction of armature 32 opens the energizing circuit of relay 24, thereby permitting its armatures 30 and 31 to fall back and open the circuit through the signaling device 34 and also the energizing circuit through relay 26. The instant relay 24 is deenergized, and the circuit of relay 26 is opened, the armatures 32 and 33 of relay 26 fall back, thereby completing an energizing circuit again as previously traced through relay 24, and closing the line circuit L through armature 33 and back contact of relay 26. The energization of relay 24 again causes the operation of signaling device 34 and again closes the energizing circuit through relay 26. Thus it will be seen that relays 24 and 26 operate alternately and are intercontrolling in such a manner as to open and close the line circuit periodically at the back contact of relay 33. The opening and closing of the line circuit at the back contact of relay 33 causes the energization and deenergization of line relay 11 at station A to thereby operate a local sounder or signaling device, which may be connected in a well-known manner in the local circuit 12, thereby informing the operator at the originating or sending station A that the code signal transmitted to station B has been received.

The operation of relays 24 and 26 may be adjusted, if so desired (by adjusting the travel of their armatures and the tension of their springs which normally hold the armatures in retracted positions), to open and close the line circuit L a definite or predetermined number of times per second, thereby causing the signaling device at the sending station to operate a predetermined number of times per second or to give a code signal. Also the corresponding relays 24 and 26 at the other stations connected to the line may be adjusted to open and close the line circuit a different number of times per second, in order to apprise the operator at the originat-

ing or sending station that a particular station has been signalled. For example, station B may send back two impulses per second, station C, four impulses per second, and so on.

The relay 22 at station B is made slow-releasing so that it will not respond to the opening and closing of the local circuit 17 at the contacts of relay 14 when the answer-back apparatus is functioning to send impulses back to the originating station. After the operator at station A has received the answer-back signal, the key at station A may be opened for a second or more to thereby open the line circuit and cause the armature 16 of line relay 14 to fall back a sufficient period of time to cause the deenergization of relay 22, and permit the equipment at the receiving station including the selector 19, signal 34 and answer-back relays 24 and 26 to be restored to normal. The apparatus at station B may also be restored to normal by opening the key or switch 10 at that station. Thus it is possible to restore the selector signal and answer-back equipment at either the originating or called station.

The signaling device 34 is represented in the accompanying drawing as a lamp. It will be understood, however, that a bell or any other suitable signaling device may be employed as desired.

The local circuits and equipment shown at station C are the same as those shown and described at station B, except that the circuit for relay 22 is through a normally closed key 35 instead of through the contact and armature 16 of main line relay 14. In the arrangement shown at station C, relay 22 need not be slow-releasing. The answer-back equipment at station C when once set in operation will continue to operate until stopped by the operator opening key 35 at that station.

Although the accompanying drawing shows the preferred embodiment of applicant's invention, it will be understood that various changes and modifications may be made without departing from the spirit of the invention.

What is claimed is:

1. A signaling system comprising a normally closed line circuit, including a central station and a plurality of substations, a variable impulse transmitter at the central station, a line relay at each substation operated thereby, a step-by-step device at each of the substations selectively responsive to the variable impulses transmitted by said impulse transmitter, a slow to release relay at each of said substations, a circuit for said relay closed by said device in a predetermined position thereof, a locking circuit for said slow relay including a contact of said line relay, a pair of relays at each sub-

station, one of said pair having a contact in said line circuit and each relay controlling the circuit of the other, a circuit for one of said relays closed by said slow relay upon its energization to initiate the alternate energization and deenergization of said relays to interrupt the line circuit, an electro-responsive device in the line circuit at the central station responsive to said interruptions, and means at the central station for interrupting the line circuit for a period sufficient to allow the slow release relay to deenergize and thereby interrupt the operation of said relays.

2. A signaling system comprising a normally closed line circuit, including a central station and a plurality of substations, a variable impulse transmitter at the central station, a line relay at each substation operated thereby, a step-by-step device at each of the substations selectively responsive to the variable impulses transmitted by said impulse transmitter, a slow to release relay at each of said substations, a circuit for said relay closed by said device in a predetermined position thereof, a locking circuit for said slow relay including a contact of said line relay, a pair of relays at each substation, one of said pair having a contact in said line circuit and each relay controlling the circuit of the other, a circuit for one of said relays closed by said slow relay upon its energization to initiate the alternate energization and deenergization of said relays to interrupt the line circuit, an electro-responsive device in the line circuit at the central station responsive to said interruptions, the relays at the different substations being adjusted to interrupt the line circuit in a manner individual to such stations.

In witness whereof, I hereunto subscribe my name this 30th day of September, A. D., 1919.

JOSEPH C. FIELD.