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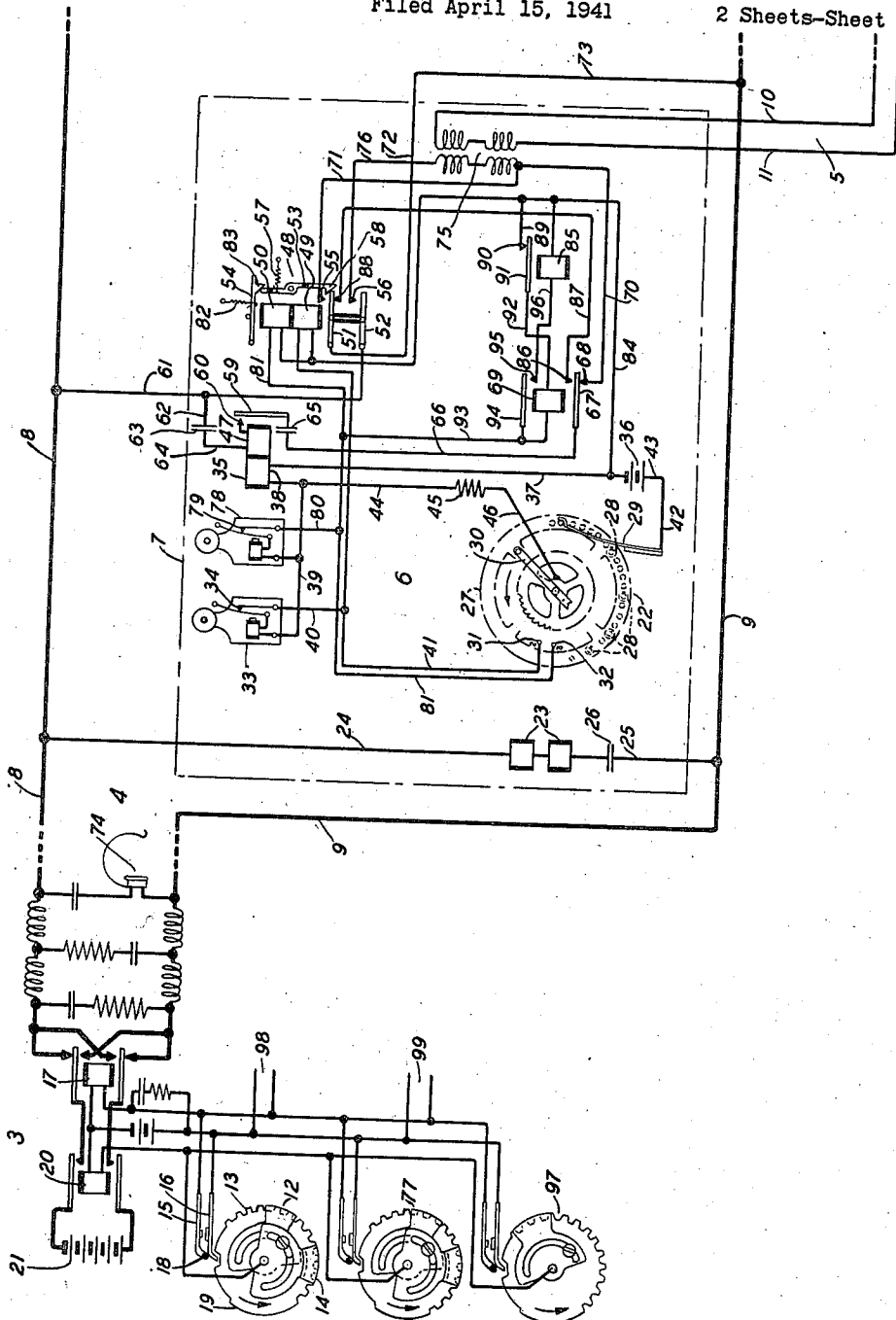
2,310,034

SIGNALING SYSTEM

Filed April 15, 1941

2 Sheets-Sheet 1

FIG. 1



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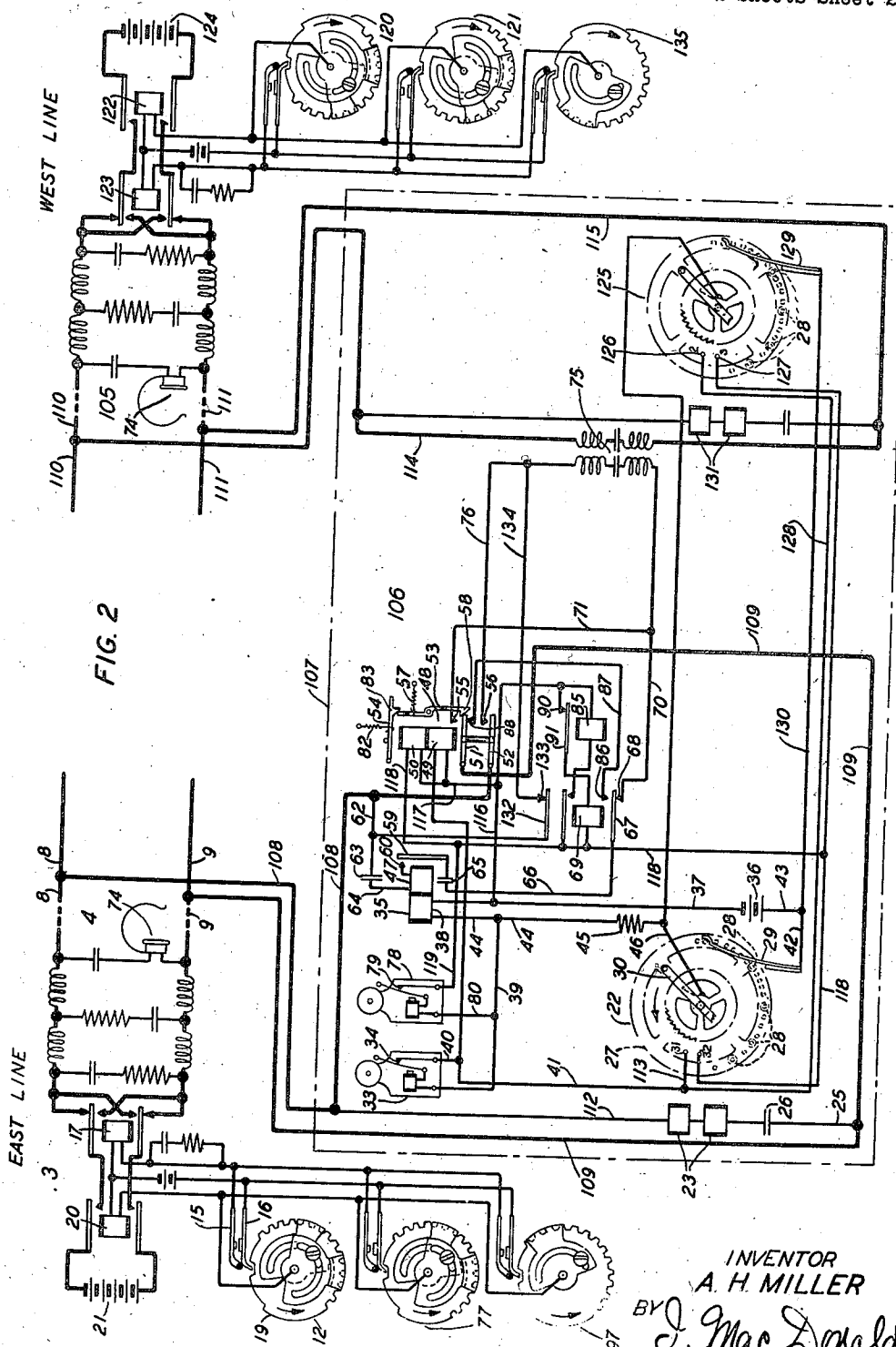
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SIGNALING SYSTEM

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Application April 15, 1941, Serial No. 388,590

1 Claim. (Cl. 177-340)

This invention relates to signaling systems and more particularly to signaling systems provided with answer-back signaling means.

The object of the invention is to provide a signaling system suitable for use in train dispatching and in which distinctive answer-back signals will be sent to the dispatcher to indicate conditions of the system.

A feature of the invention resides in the means provided for remotely controlling the connection and disconnection of the signaling system of one line to the signaling system of another line.

Another feature resides in the means provided for sending distinctive answer-back signals to the dispatcher originating the call connection.

Other features reside in the particular combination of the apparatus parts involved.

In the drawings:

Fig. 1 shows a schematic diagram of the system adapted for one-way operation by a single dispatcher; and

Fig. 2 shows a schematic diagram of the system adapted for two-way operation.

The system shown in Fig. 1 may be used by a train dispatcher in remotely controlling the connection of a branch line signalling system to the signaling system normally used by the dispatcher in selectively calling way stations on the railroad line over which he normally has control.

The system shown in Fig. 2 may be used in remotely controlling the connection of the signaling systems of two railroad or signaling systems of two divisions of a railroad, the connecting of the two systems being separately controlled by either one or the other of the two train dispatchers.

In the systems shown and hereinafter described distinctive answer-back signals are sent to the dispatcher originating the call connection to inform him when the required connection or disconnection of the lines has been accomplished.

The connection and disconnection operations are controlled by the dispatcher through the operation of code signal sending keys at the dispatcher's station and impulse operated selectors and relays. The selectors and relays may be located at some point remote from the dispatcher's station and where conductors of the branch line or other signaling line are arranged to be brought into signaling connection with the dispatcher's signaling system.

The code signal sending keys operate to control the sending of impulses to operate the selectors and may be of some well-known type such, for instance, as the impulse transmitter shown and described in J. C. Field Patent 1,306,054 issued June 10, 1919. The selectors may be of a well-known type such, for instance, as the selectors shown and described in J. C. Field Patent 1,343,256 issued June 15, 1920. It will be as-

sumed for the purpose of simplifying this description that the code signal sending keys and the selectors are of the types shown and described in the above-mentioned Field patents.

In Fig. 1, 3 indicates the train dispatcher's station apparatus, 4 the signaling system of a main line of the railroad, 5 a signaling line of a branch line of the railroad and 6 a remote station at which connection is to be made between the main line signaling system and the branch line signaling system, the remote station apparatus being shown as occupying the space defined by the dot-dash lines 7.

The dispatcher at station 3 normally uses the signaling system 4 comprising the main line conductors 8 and 9 to send signals to way stations, not shown but which are located out along the main line system, each way station having located thereat an impulse operated selector and the dispatcher having at his station a separate code signal impulse sending key or some other impulse sending device to control operation of the selectors, all of which is well known in the art and disclosed in the J. C. Field Patent 1,343,256.

In the present invention and as shown in Fig. 1, the dispatcher at station 3 may bring into connection with the main line signaling system 4, a branch line 5 comprising the conductors 10 and 11 leading to and having suitable connection with way station apparatus, not shown but which may be located at a station or stations on the branch line.

When the dispatcher at station 3 desires to bring the branch line 5 into communication with the main line system, he operates a code signal impulse sending key 12. The code signal sending key 12, as clearly described in the J. C. Field Patent 1,306,054, is provided with teeth, certain ones of which may be blocked out by one or both adjustable cams 13 and 14 to obtain a particular number and combination of effective teeth for calling purposes. The key is adapted to rotate in the direction of the arrow and the teeth thereon are provided to move contact springs 15 and 16 in circuit with the pole changing relay 17. The free ends of the contact springs 15 and 16 are bent downward and an insulating roller 18 is provided on the free end of the contact spring 15. This insulating roller is engaged by the cam 13 to separate the contact springs 15 and 16 during the passage of the cam 13 under the roller 18. Contact of the spring 16 with the toothed wheel 19 closes a circuit for relay 20 which, upon energization, connects the battery 21 to the main line system 4 comprising the conductors 8 and 9. The teeth on the wheel 19 cause alternate closing and opening of the contact springs 15 and 16 so that the pole changing relay 17 is alternately energized and deenergized to reverse the connection of the

battery 21 relative to the conductors 8 and 9. Operation of the pole changing relay 17 controls the operation of the selector 22, the electromagnets 23 of which are alternately energized and deenergized over the conductors 8, 9, 24 and 25 and through the condenser 26 to step the wheel 27 in the direction of the arrow. The wheel 27 is equipped with holding pins 28 which are engaged by the upper end of a holding contact spring 29 to hold the wheel 27 against reverse movement at certain predetermined positions. A spring contact 30 is rotated with the wheel 27 to engage a fixed contact 31 or 32 according to the particular number and combination of impulses received by the selector 22. Assuming that the code sending key 12 is set to send a series of impulses divided into groups of 8—5—4 and that the selector 22 has its holding pins 28 set so that the contact 30 will be on contact 31 on the last impulse, the apparatus at the station 6 will be operated to connect the branch line 5 to the main line 4. The selector 22 and the code sending keys provided for controlling the operation of the selector are constructed and arranged so that the selector will remain on the selected contact 31 or 32 for a brief period known as the ringing period, and will then restore to normal position.

When the spring contact 30 of the selector 22 makes contact with the fixed contact 31, a bell 33 or other signaling device having self-interrupter contacts 34 therein is energized. Simultaneously with the energization of the bell 33 a relay 35 and a mechanical locking relay 48 are energized to bring the branch line 5 into signaling connection with the main line 4. The circuit for energization of the bell 33 and the relay 35 may be traced as follows: local battery 36, conductor 37, operating winding 38 of relay 35, conductor 44 to conductor 39, winding of bell 33 and self-interrupter contacts 34 of bell 33, conductor 40, conductor 41 fixed contact 31 and contact spring 30 of selector 22, wheel 27 and holding spring 29 of selector 22, conductors 42 and 43 to battery 36. Relay 35 is held against deenergization when the self-interrupter contacts 34 of the bell 33 are opened through a holding circuit which may be traced from battery 36, through conductor 37, operating winding 38 of relay 35, conductor 44, resistance 45, conductor 46, wheel 27 and holding spring 29, conductors 42 and 43 to battery 36.

The relay 35 is equipped with an extra winding 47 which is in inductive relation with the operating winding 38 but is not part of the operating winding. When the relay 35 and the mechanical locking relay 48 are simultaneously operated the winding 47 of relay 35 is connected in bridge of the main line conductors 8 and 9. The relay 48 may be of any suitable construction providing that it may be remotely controlled to lock contacts into a circuit closed condition and then remotely controlled to unlock the contacts made in its first operation.

The relay 48 as shown in the drawings is equipped with two operating windings 49 and 50, a pair of mechanically connected contact-armatures 51 and 52, a pivoted latch 53 and a release armature 54. When the relay 48 is operated, through energization of its lower winding 49, it pulls its armatures 51 and 52 into contact with the respective front contacts 55 and 56. The circuit for energization of winding 49 may be traced as follows: battery 36, conductor 84, winding 49 of relay 48, conductor 41, contact 31 and spring contact 30 of selector 22, wheel 27, holding spring 29

29, conductors 42 and 43 to battery 36. Upward movement of armature 51 displaces the lower end of the latch 53 against the action of a spring 57. The displacement of the lower end of the latch is sufficient to permit the armature 51 to pass above a bevelled hook 58 on the lower end of the latch so that the latch 53 will hold the armatures 51 and 52 in contact with the respective front contacts 55 and 56. Relay 35 being operated to pull its armature 59 against front contact 60, the extra winding 47 on relay 35 is in bridge of the line wires 8 and 9 of the main line signaling system. The circuit through the winding 47 may be traced as follows: conductor 8, conductor 61, conductor 62, condenser 63, conductor 64, winding 47 on relay 35, front contact 60, armature 59, condenser 65, conductor 66, lower armature 67 and back contact 68 of relay 69, conductor 70, conductor 71, front contact 55 and armature 51 of relay 48, conductor 72 and conductor 73 to main line conductor 9.

When the relays 35 and 48 have been operated as above described and the selector 22 is on contact 31 and the bell 33 is ringing a straight buzzer tone is produced in the telephone set 74 of the dispatcher at station 3 to indicate to the dispatcher that the apparatus at station 6 has been operated to bring the branch line 5 into communication with the main line 4, the buzzer signals being produced by operation of the self-interrupter contacts 34 in the bell 33 and being inductively transmitted from the operating winding 38 of relay 35 to the extra winding 47 on the relay 35. At the end of the ringing period the selector 22 is automatically restored to normal position, relay 35 becomes deenergized and releases its armature 59. The mechanical locking relay 48 is held however in a locked condition by the latch 53. The dispatcher at station 3 may now talk or otherwise transmit signals from station 3 to the branch line 5 it being understood that the dispatcher at station 3 has a transmitter or other signaling device in connection with the line wires 8 and 9 for communicating with the branch line 5 when the branch line 5 is brought into communicating condition with the main line 4. The talking or signaling circuit as shown in Fig. 1 is through the repeating coil 75 and the primary side of this circuit may be traced as follows: main line conductor 8, conductor 61, lowermost armature 52 and front contact 56 of relay 48, conductor 76, primary winding of repeating coil 75, conductor 71, front contact 55 and armature 51 of relay 48, conductor 72 and conductor 73 to main line conductor 9. The secondary side of the talking or signaling circuit is through the conductors 10 and 11 of the branch line 5 and the secondary winding of repeating coil 75.

When the dispatcher at station 3 desires to disconnect the branch line 5 from communicative condition with the main line 4 he sends a set of signal impulses to operate the selector 22 to the fixed contact 32. This set of impulses may be sent by operation of a suitable code signal sending key at the dispatcher's station 3. The code signal sending key 77 may be used for this purpose, the key being set to control the sending of the correct number and arrangement of impulses required to step the selector 22 around so that the spring contact 30 will come to rest on the contact 32. This closes a circuit for the bell 78 which is equipped with self-interrupter contacts 79. A circuit is also closed at the same time to operate relay 35 to pull

armature 59 against front contact 60. The circuit for operating the bell 78 and relay 35 may be traced as follows: battery 36, conductor 37, operating winding 38 of relay 35, conductor 39, winding and self-interrupter contacts 79 of bell 78, conductor 80, conductor 81, contact 32 and spring contact 30 of selector 22, wheel 27 and holding spring 29, conductors 42 and 43 to battery 36. The selector 22 will hold on contact 32 for a brief period known as the ringing period and will then automatically restore to normal position. During the ringing period the bell 78 will be operated to alternately break and make its self-interrupter contacts 79 and relay 35 will be held against release of its armature 59 from front contact 60 by the holding circuit extending through its operating winding 38, the conductors 37 and 44, resistance 45, conductor 46, wheel 27 and holding spring 29 of selector 22. Simultaneously with the energization of the bell 78 and the relay 35 the mechanical locking relay 48 will be operated to release the latch 53 from its holding condition of armatures 51 and 52. The latch 53 is released by the pulling down of armature 54 against the action of spring 82, the armature 54 being pulled down when the upper winding 50 of relay 48 is energized and having a cam 83 bearing against the upper end portion of the latch 53. The upper winding 50 of the relay 48 is energized when the spring contact 30 of the selector 22 comes to rest on the fixed contact 32. The circuit for the energization of the winding 50 may be traced as follows: battery 36, conductor 84, upper winding 50 of relay 48, conductor 81, fixed contact 32, spring contact 30, wheel 27 and holding spring 29 of selector 22, conductors 42 and 43 to battery 36. Relay 48 is therefore operated to release the armatures 51 and 52 from engagement with the respective front contacts 55 and 56 and thus disconnect the branch line 5 from communicative condition with the main line signaling system 4. The bell 78 through its interrupter contacts 79 operates to produce a pulsating current in the operating winding 38 of relay 35 and this pulsating current is inductively picked up by the winding 47 of relay 35 and sent back to the dispatcher at station 3 to produce an answer-back signal.

This answer-back signal, however, is made distinguishable from the answer-back signal received by the dispatcher at station 3 when the branch line 5 was brought into connection with the main line system. The second answer-back signal and which will hereinafter be called the release answer-back signal is made distinguishable from the first answer-back signal by the operation of relays 69 and 85 which are operated in sequence when the spring contact 30 of the selector 22 is in engagement with contact 32. Relay 69 pulls up its lower armature 67 from engagement with back contact 68 and opens the original answer-back circuit at this point. It also operates to pull the armature 67 against the lower front contact 86 and thus establish a new answer-back circuit. This new answer-back circuit may be traced from conductor 8, through conductor 61, conductor 62, condenser 63, conductor 64, winding 47, front contact 60 and armature 59 of relay 35, condenser 65, conductor 66, lower armature 67 and lower front contact 86 of relay 69, conductor 87 back contact 88 and armature 51 of relay 48, conductor 72 and conductor 73 to line conductor 9. The circuit for operation of relay 69 is as follows: battery 36, conductor 84,

conductor 89, back contact 90 and armature 91 of relay 85, conductor 92, winding of relay 69, conductor 93, conductor 81, contact 32, spring contact 30, wheel 27 and holding spring 29 of selector 22, conductors 42 and 43 to battery 36. Relay 69 pulls its upper armature 94 against upper front contact 95 and closes a circuit for relay 85 through conductor 96, and relay 85 then operates to pull its armature 91 away from back contact 90 and thus open the energizing circuit of relay 69. It will be seen therefore that relays 69 and 85 operating in sequence continue to close and open the new answer-back circuit through the lower armature 67 and lower front contact 86 of relay 69. The release answer-back signal therefore is in effect broken up so that it will be head in a series of buzzer tones with distinct pauses instead of a continuous buzzer tone. It is therefore readily distinguishable by the dispatcher at station 3 from the first answer-back signal received and assures him that the branch line 5 has been disconnected from the main line signaling system.

The dispatcher at station 3 normally uses the main line signaling system comprising the conductors 8 and 9 to selectively signal way stations on the main line. The way stations are not shown in the drawings in this case, however, because the showing of them is not essential to the description and understanding of this invention and their use is well known. The selectors at such way stations, however, could be brought into operation in selectively calling the way stations by the dispatcher operating a suitable code signal sending key such, for instance, as the code signal sending key 97 or keys at the points 98 and 99.

The system shown in Fig. 2 is designed to provide a means for interconnecting the signaling systems of two main line railroads or the signaling systems of two divisions of a railroad. This system employs the same kind and the same general arrangement of apparatus parts as the system shown in Fig. 1. The like parts in the two systems will therefore be identified by the same numerals. The system is arranged, however, to permit the interconnecting of the two signaling systems by the operation of apparatus under the control of either of the two train dispatchers. Each train dispatcher's station is equipped with code signal sending means to separately control the connecting of the two signaling systems.

In Fig. 2, 3 indicates the train dispatcher's station apparatus of one division of a railroad signaling system (east line), 4 the signaling system of the east division, 105 a signaling system of another division of the railroad (west line) and 106 a remote station at which the two divisions of the railroad signaling systems may be brought into connection, the remote station apparatus being shown as occupying the space defined by the dot-dash lines 107.

The dispatcher at station 3 normally uses the signaling system 4 comprising the main line conductors 8 and 9 to send signals to way stations, not shown, but which are located out along the east line system, each way station having located thereat an impulse operated selector and the dispatcher having at his station a separate impulse sending key or some other suitable impulse sending device to control operation of the selectors, all of which is well known in the art.

In the present invention and as shown in Fig. 2 the dispatcher at station 3 may bring into connection with one division of the main line signaling system 3 (east line) another division of

the main line signaling system 105 (west line), comprising the conductors 110 and 111 leading to and having suitable connection with way station apparatus, not shown, but which may be located at a station or stations on the west line.

When the dispatcher at station 3 desires to bring the east line signaling system into communication with the west line signaling system he operates a code signal sending key 12. The key 12 is adapted to move its contact springs 15 and 16 into and out of circuit closing condition for the pole changing relay 17 and also closes a circuit to relay 20 which upon energization connects the battery 21 to the east line signaling system 4. The teeth on the wheel 19 cause alternate closing and opening of the contact springs 15 and 16 so that the pole changing relay 17 is alternately energized and deenergized to reverse the connection of the battery 21 relative to the conductors 8 and 9. Operation of the pole changing relay 17 controls the operation of the selector 22, the electromagnets 23 of which are alternately energized and deenergized over the conductors 8, 9, 108, 109 and 112 and through the condenser 26 to step the wheel 27 in the direction of the arrow. Assuming that the code sending key 12 is set to send a series of impulses to operate the selector 22 to a contact making position and that the selector 22 has its holding pins 28 set so that the contact 30 will be on contact 31 on the last impulse the apparatus at the station 106 will be operated to connect the east line signaling system to the west line signaling system. The selector 22 and the code sending keys provided for controlling the operation of the selector are constructed and arranged so that the selector will remain on the selected contact 31 or 32 for a brief period known as the ringing period and will then restore to normal position.

When the spring contact 30 of the selector 22 comes to rest on the fixed contact 31, the bell 33 or other signaling device having self-interrupter contacts 34 therein is energized. Simultaneously, with the energization of the bell 33, the relay 35 and the mechanical locking relay 48 are energized to bring the east line signaling system into connection with the west line signaling system. The circuit for energization of the bell 33 and the relay 35 may be traced as follows: local battery 36, conductor 37, operating winding 38 of relay 35, conductor 44, conductor 39, winding of bell 33 and self-interrupter contacts 34 of bell 33, conductor 40, conductor 41, conductor 113, fixed contact 31 and contact spring 30 of selector 22, wheel 27 and holding spring 29 of the selector 22, conductor 42 and conductor 43 to battery 36. Relay 35 is held against deenergization when the self-interrupter contacts of the bell 33 are opened through a holding circuit which may be traced from battery 36, through conductor 37, operating winding 38 of relay 35, conductor 44, resistance 45, conductor 46, wheel 27 and holding spring 29, conductor 42 and conductor 43 to battery 36.

The relay 35 operates to connect its extra winding 47 across the conductors 108 and 109 when the selector 22 is operated to a ringing position and the mechanical locking relay 48 is operated. The structure of the mechanical locking relay 48 has already been described in connection with Fig. 1. The circuit established by the operation of relay 35 and through contacts of the relay 48, may be traced as follows: conductor 108, conductor 62, condenser 63, conductor 64, extra winding 47 of relay 35, front contact 60 and armature 59 of relay 35, condenser 65, conductor

66, lower armature 67 of relay 69, back contact 68, conductor 70, conductor 71, upper front contact 55 and armature 51 of relay 48 to conductor 109.

It will be seen that when relay 35 is operated to pull its armature 59 against contact 60 and when relay 48 has been operated to pull its armature 51 against contact 55 and 52 against 56 and the relay 48 is locked in this condition by means of the latch 53, an answer-back circuit is obtained to send signals to the train dispatcher who originated the call connection, the answer-back signals being produced by operation of the self-interrupter contacts in the bell 33 and being inductively picked up from the operating winding 38 of the relay 35 by the extra winding 47 on this relay.

At the end of the ringing period the selector 22 will automatically restore to normal position and relay 35 will release its armature 59 from contact with front contact 60 to break the answer-back circuit. The mechanical locking relay 48, however, will remain in a latched condition. The dispatcher at station 3 may then talk or otherwise signal to the dispatcher on the west line. The talking or signaling circuit established from the east line may be traced as follows: line conductor 8, conductor 108, lowermost armature 52 and front contact 56 of relay 48, conductor 76, primary winding of repeating coil 75, conductor 71, front contact 55 and uppermost lower armature 51 of relay 48, conductor 109 and line conductor 9 of the east line signaling system. The telephone conversation or other signals sent by the dispatcher at station 3 are transmitted through the repeating coil 75 to conductors 114 and 115 leading to the respective line conductors 110 and 111 of the west line signaling system.

By operating the code sending key 77 in the same manner as in Fig. 1 the dispatcher at station 3 may remotely control the apparatus at station 106 to disconnect the west line system from the east line system. In this case the selector 22 is operated to its fixed contact 22 to bring the bell 78 into operation and to again operate relay 35. Simultaneously with the operation of relay 35 the relay 48 is operated to release the latch 53. The circuit for operating the relay 48 to release its latch may be traced as follows: battery 36, conductor 37, conductor 116, conductor 117, upper winding 50 of relay 48, conductor 118, fixed contact 32 of selector 22, spring contact 30, wheel 27 and holding spring 29 of selector 22, conductors 42 and 43 to battery 36. The circuit for operation of relay 35 and bell 78 may be traced as follows: battery 36, conductor 37, operating winding 38 of relay 35, conductor 44, conductor 39, conductor 80, winding of bell 78, interrupter contacts 79, conductor 119, conductor 118, fixed contact 32 of selector 22, spring contact 30, wheel 27, holding spring 29 and conductors 42 and 43 to battery 36.

When the upper winding 50 of relay 48 is energized the relay 48 will release the latch 53 to permit the armatures 51 and 52 to restore to normal position. Relay 35 will be operated to close its armature 59 against contact 60 and the bell 78 will be brought into operation to send the release answer-back signal. Relay 69 is brought into operation simultaneously with the operation of relay 35 and completes the release answer-back circuit through armature 67 and front contact 86. The release answer-back circuit may be traced through the extra winding 47 of relay 35, front contact 60 and armature 59, condenser 65, conductor 66, armature 67 and

front contact 86 of relay 69, conductor 87, back contact 88 and armature 51 of relay 48, conductor 109 to line wire 9, the other side of the circuit being from line wire 8, conductor 108, conductor 62, condenser 63 and conductor 64 to winding 47 of relay 35.

Relay 69 is operated through a circuit involving the armature 91 and back contact 90 of relay 85. The relays 69 and 85 are operated in sequence as explained in the description of Fig. 1 and break up the release answer-back signal so that it may be readily distinguished from the original answer-back signal, the release answer-back signal being heard in the dispatcher's telephone set 74 at station 3 in the form of interrupted buzzer tones.

The dispatcher at the west line station 105 may bring the west line into communication with the east line by operating code signal sending keys at the station 105 in the same manner as the east line dispatcher at station 3 brought the two line systems into communication.

It will be understood that the code signal sending keys 120 and 121 at the west line station 105 are duplicates of the respective code signal sending keys 12 and 77 of the east line station 3. The keys 120 and 121 may be separately operated in the same manner as keys 12 and 77 to control the operation of the apparatus at station 106.

When the key 120 is operated it brings into operation a line relay 122 and the pole changing relay 123. Relay 122 connects the battery 124 to the line system comprising the line conductors 110 and 111. Impulses sent over the line conductors 110 and 111 and through the conductors 114 and 115 step a selector 125 around to a contact making position. The selector 125 is a duplicate of the selector 22. The fixed contacts 126 and 127 of selector 125 correspond to the respective fixed contacts 31 and 32 of the selector 22. Operation of the selector 125 to the contact 126 will cause operation of the bell 33, the relay 35 and the mechanical locking relay 48, the contact 126 being connected by conductor 128, to conductor 41 and the holding spring 129 being connected by conductor 130 to conductor 43.

When the selector 125 is operated by means of its electromagnets 131 to contact 126 the bell 33, relay 35 and the mechanical locking relay 48 are brought into operation. The answer-back signal produced will be transmitted back to the dispatcher at station 105 to indicate that the west line has been connected to the east line system, the answer-back signal being transmitted through the repeating coil 75, the primary side of which is connected by conductor 76 to the front contact 56 of relay 48 and by conductor 70 to the back contact 68 of relay 69. At the end of the ringing period the selector 125 will automatically restore to normal position, the bell 33 and the relay 35 will be deenergized but the relay 48 will remain in latched condition. The dispatcher at the west line station 105 may then have communication with the east line system through the repeating coil 75.

To disconnect the west line system from the east line the dispatcher at the west line station 105 will operate the code signal sending key 121 to operate the selector 125 to the contact 127.

The bell 78, relay 35 and the mechanical locking relay 48 will then be operated. Relays 69 and 85 will also be brought into sequential oper-

ation to produce the release answer-back signal. The relay 48 on this second operation from the station 105 will release its latch 53 to release the connection originally established between the two line systems. It will be seen, however, that the uppermost armature 132 of relay 69 is in engagement with back contact 133 which through conductor 134 is connected to the primary of the repeating coil 75 and that this primary is also connected through conductor 70 to the back contact 68 of relay 69. During the ringing period the release answer-back signals will therefore be transmitted through the repeating coil 75 back to the dispatcher at station 105 to assure him that the mechanical locking relay 48 has been operated to release the connection originally established between the two lines. The release answer-back signal will be made intermittent by the sequential operations of relays 69 and 85. At the end of the ringing period the selector 125 will automatically restore to normal position, and the bell 78 and the relay 35 will be deenergized.

The east line and the west line systems may be equipped with suitable code signal sending keys to operate selectors at way stations not shown but which are located along the lines. The key 97 at station 3 is provided for this purpose and a corresponding key 135 is provided at station 105.

What is claimed is:

The combination with a main line signaling system suitable for use in train dispatching and a branch line system to be connected to said main line system, said main line system having connected therein a selector, two signaling devices operable to send answer-back signals over said main line signaling system, a two-winding relay operable on a first position of said selector to answer-back connect one of said signaling devices to said main line system and operable on a second position of said selector to partly make ready a circuit to answer-back connect the other of said signaling devices to said main line system and means to operate said selector, said signaling devices and said two-winding relay, of a mechanical latching relay operable on a first position of said selector to latch-connect said systems together and complete an answer-back circuit for the signaling device selected on the first position of said selector and operable on the second position of said selector to release the branch line system from connection with said main line system and partly complete a second answer-back circuit involving the signaling device selected by said selector on the second position of said selector, means to operate said latching relay, a pair of sequentially operated relays operating on the second position of said selector and when said latching relay releases the branch line from connection with said main line, means to operate said sequentially operated relays, the first relay of said pair of sequentially operated relays operating to complete the second answer-back circuit and the second relay of said pair operating to open the operating circuit of the first relay of said pair, and said pair of sequentially operated relays operating to intermittently close and open the second answer-back circuit to make the answer-back signal sent on release of the connection between said systems distinguishable from the answer-back signal sent on connection of said systems.

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