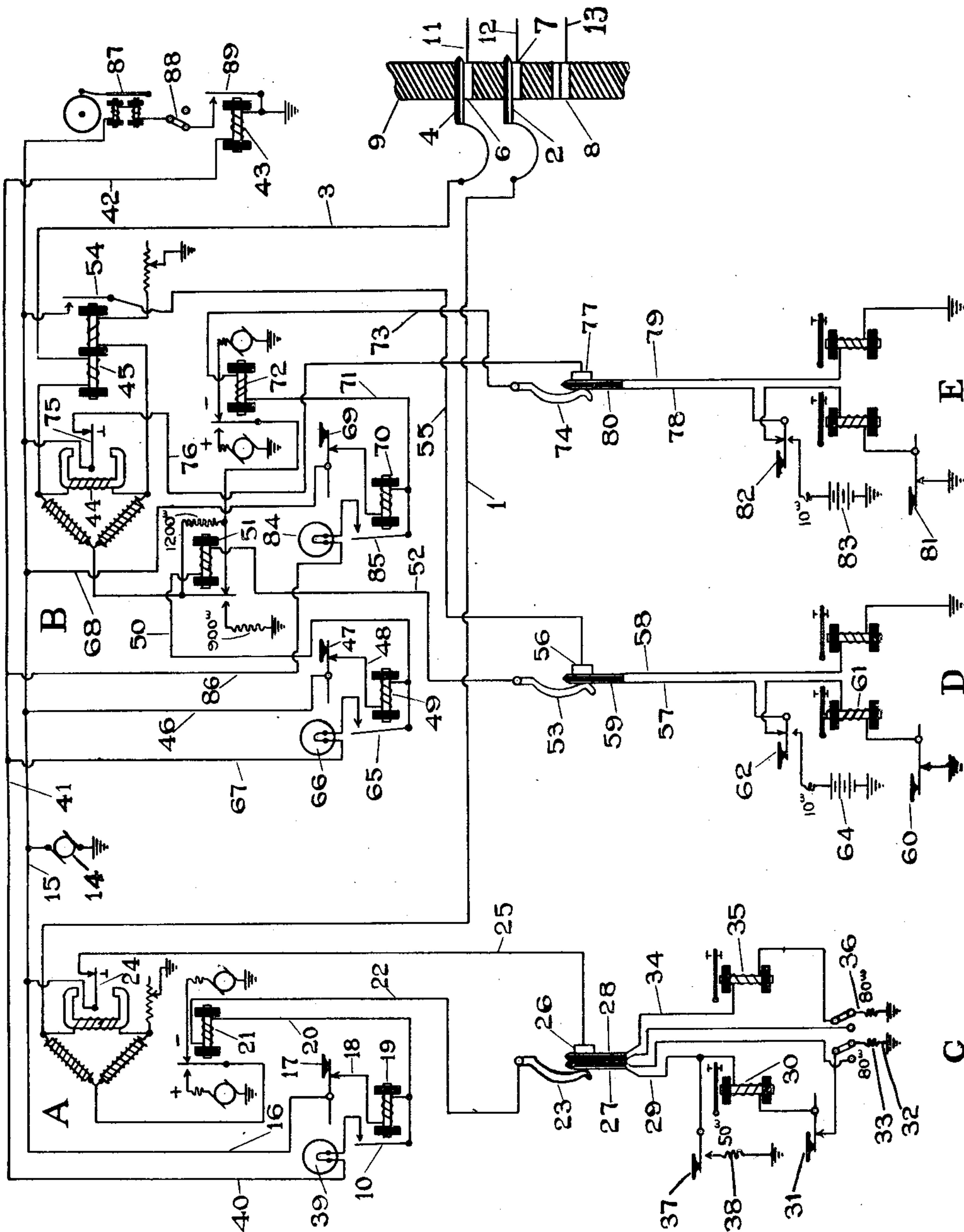


W. E. ATHEARN.
TELEGRAPH SYSTEM.
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1,048,639.

Patented Dec. 31, 1912.



Witnesses:
Eda E. Gilmore
Beatrice Morris

Inventor
William E. Athearn.
By his Attorney
Nicholas M. Goodlett Jr.

UNITED STATES PATENT OFFICE.

WILLIAM E. ATHEARN, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE WESTERN UNION TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

TELEGRAPH SYSTEM.

1,048,639.

Specification of Letters Patent.

Patented Dec. 31, 1912.

Application filed February 19, 1912. Serial No. 678,664.

To all whom it may concern:

Be it known that I, WILLIAM E. ATHEARN, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Telegraph Systems, of which the following is a specification.

This invention relates to improvements in telegraph systems.

The invention seeks to provide an arrangement of circuits which makes it possible for substations connected with the main-office to signal to the main-office attendant when the substation operator encounters trouble on his working circuit, and whereby the main-office attendant may respond to such signals with greater convenience and less loss of time than has heretofore been possible. When the main-office attendant receives such a signal, it is his duty to locate and correct the trouble, or if this is not feasible, to connect the substation extension with another circuit known to be in working order.

According to the usual practice heretofore followed, the main lines terminate at a main-office where multiplex sets are usually provided for working the main lines. The main lines are connected with terminals at a switch board and the multiplex sets are connected with corresponding terminals, whereby any multiplex set may be connected with any of the main lines. Some of these main lines are usually leased for full time or part time to subscribers, and the subscribers are provided with extensions which terminate at one end at the subscriber's substation and at the other end at the main-office. These substation lines terminate at the main-office in plugs or other suitable terminals adapted for connection with corresponding spring-jacks or other terminals, which latter are connected with the multiplex sets. Similar substation lines, also connecting with the main-office, are generally provided for the use of operators at substations located at some part of the main-office building. By this arrangement any substation line may be connected with any main line to thus form a connected line, and any multiplex set at the main-office may be included in this connected line. Such connections may be made and broken at the will of the main-office attendant.

Signals have been heretofore provided at

the main-office for operation by the substation operators when the latter have encountered trouble in working their lines. According to the arrangement heretofore in general use, these signals were operated by special circuits connecting the substations with the main-office. The signals were thus associated with the substations and were grouped together in an appropriate place apart from the multiplex sets. Each signal bore the designation of its associated substation. When the substation operator operated one of such signals, the main-office attendant consulted his register to determine which particular substation was signaling. It was then necessary for him, by inspection, to determine which of the multiplex sets was being operated by the signaling substation, in order that he might correct or obviate the trouble. Moreover, it frequently happened that the signaling substation was connected with a multiplex set other than that usually appropriated to it. Thus, there was considerable loss of time and inconvenience involved in answering the signals.

In accordance with the present invention, each multiplex set or set-portion has associated with it its own signal, and the signal is preferably located near its appropriate set or set-portion. When a signal is set by a substation operator, the main-office attendant knows immediately that his attention is required at the multiplex set belonging to that particular signal. He is not concerned to determine which substation set the signal. In this way much time is saved in locating the seat of trouble and in removing it or shifting the substation line to a new connection.

The present invention also makes use of a signal which, when once set, remains in this condition until restored by the main-office attendant. In the preferred arrangement, as hereinafter set forth, the signal is visual and is set by a relay located in the circuit over which the substation is working. This relay is unresponsive to the working current but responds to the operation of a signaling switch at the substation, and thereby sets the signal. When the relay has thus been once operated, it preferably remains energized to continue the signal in set condition until deenergized by the main-office attendant. This relay may, therefore, be termed a locking relay. In the best ar-

rangement this relay operates to close a signaling circuit with which the signal is connected.

There is also preferably provided at the main-office a suitable signal, preferably a buzzer or other audible signal, common to all or a portion of the multiplex sets, so that the attendant may be called if he is not in close attendance upon the individual or visual signals. A switch is provided for cutting in or out this common signal as occasion may require.

The accompanying drawing, forming part of this specification, is a diagrammatic representation of the invention in its preferred form.

Referring now to this drawing, A and B are, respectively, duplex and quadruplex sets at the main-office. The main line wire 1 of the set A terminates in a switch plug 2. The main line wire 3 of the set B terminates in a switch plug 4. These switch plugs are adapted to enter sockets 6, 7 and 8 in a switch board 9, where terminate the main lines 11, 12 and 13. In this way any one of the multiplex sets at the main-office may be connected with any one of the main lines. The sending side of the duplex set A comprises the generator 14, wire 15, wire 16, switch or key 17, wire 18, signaling relay 19, wire 20, transmitter relay 21, wire 22, and spring terminal 23 of a spring-jack. The receiving side of duplex set A comprises generator 14, wire 15, armature 24, wire 25, and contact 26 of the spring-jack.

C is a substation provided with sending and receiving instruments for the use of a main-office operator. The station C is connected with the main-office by a substation line which terminates at the main-office in switch plugs 27 and 28 adapted for connection with spring-jack contacts 23 and 26. Each of these plugs is connected with two wires of the substation line. The sending side of this substation line comprises wire 29, sounder 30, sending key 31, ground tap 32 and resistance 33. The receiving side of this substation line comprises wire 34, sounder 35, and ground tap 36. 37 is a signaling key at station C. It is connected on one side with wire 29 and on the other side with a ground tap which includes the resistance 38. Signaling relay 19 at the main-office controls a suitable signal which is preferably visual in character.

In the preferred arrangement, when the relay is energized it sets the signal to call the attention of the main-office attendant and the signal remains set until restored by said attendant. In the best arrangement, the signal consists of an electric lamp 39 connected in a circuit extending from generator 14 through wires 15 and 16, switch 17, wire 18, coil of relay 19, armature 10 of

relay 19, lamp 39, wires 40, 41 and 42, pilot relay 43 and to ground. The relay 19 is unresponsive to the working current which passes through it but is arranged to respond to the operation of the signaling key 37 at the station C. This result may be provided for in various ways. In the present instance, it is accomplished by decreasing the resistance in the sending side when signaling key 37 is pressed to throw in its ground tap. To this end the resistance 38 is fixed at say 50 ohms, and the resistance 33 is fixed at say 80 ohms. These resistances, of course, may be varied so long as the signaling circuit is of sufficiently less resistance than the working circuit.

In the operation of calling the attendant at the main-office from substation C, the operator at substation C presses his key 37 and thereby closes a circuit which may be traced backward from ground, through resistance 38, key 37, wire 29, plug 27, contact 23, wire 22, relay 21, wire 20, relay 19, wire 18, switch 17, wire 16 and generator 14. This energizes relay 19 and closes at armature 10 the signaling circuit heretofore traced. The current in this signaling circuit is sufficient to cause relay 19 to hold up its armature 10, even after switch 37 has been released, so that the signal 39 continues in its set condition and remains in this condition until the attendant takes note thereof and opens his switch 17, whereupon the signal and signaling circuit are restored to normal condition. After the operator at substation C has set the signal, it is not necessary for him to remain idle. If his working circuit permits operation with less efficiency or reliability or at a reduced speed, he may continue to operate the circuit without affecting the signal already set by him at the main-office.

The quadruplex set B comprises two usual portions or set-portions, one of which works through the polarized relay 44 and the other through the neutral relay 45. The sending side of the neutral set-portion includes generator 14, wires 15 and 46, switch or key 47, wire 48, signaling relay 49, wire 50, transmitter relay 51, wire 52, and spring-jack contact 53. The receiving side of the neutral set-portion comprises generator 14, wire 15, armature 54, wire 55 and spring-jack contact 56.

D is a subscriber's station having a substation line connecting it with the main-office. This substation line comprises sending wire 57 and receiving wire 58 terminating at the contacts of a switch plug 59. This sending wire 57 is provided with the usual operator's sending key 60 and sounder 61.

62 is a signaling key connected on one side with wire 57 and on the other side with the ground tap including a battery 64.

The signaling relay 49 operates an arma-

ture 65 which controls a signaling circuit including lamp 66. Said circuit is as follows,—from generator 14, through wires 15 and 46, key 47, wire 48, relay 49, armature 65, lamp 66, wire 67, wires 41 and 42, pilot relay 43 to ground. When the operator at station D encounters trouble on his line, he connects the sending side of his substation line with ground through battery 64 by pressing key 62. This increases the current through relay 49 and closes the signaling circuit through lamp 66 and lights the lamp. Relay 49 is unresponsive to the working current but responds to the increase of current from battery 64. Although this relay is initially responsive only to such increased current, it maintains the attraction of its armature under the influence of the working or telegraph current and, consequently, after the battery 64 is cut out it maintains the illumination of lamp 66 until the attendant opens the switch or key 47.

The sending side of the polarized set-portion of the set B comprises generator 14, wire 15, wire 68, attendant's switch or key 69, signaling relay 70, wire 71, pole changing transmitter 72, wire 73 and spring-jack contact 74. The receiving side of the polarized set portion may be traced from generator 14, through wire 15, polarized armature 75, wire 76 to spring-jack contact 77.

E is a subscriber's substation connected with the main-office by a substation line consisting of the wires 78 and 79 terminating in the plug 80.

81 is the operator's sending key at station E.

82 is the signaling key at station E adapted to connect battery 83 to the sending side of the line and thereby energize magnet 70 to close the signaling circuit through signal lamp 84. This signaling circuit may be traced from generator 14, through wires 15 and 68, key 69, relay 70, armature 85, lamp 84, wires 86 and 41, and pilot relay 43 to ground. Relay 70 operates in substantially the same way and under similar conditions to relay 49.

A suitable signal is provided at the main-office, preferably an audible signal such as the buzzer 87, which may be thrown into use when the number of attendants at the main-office is not sufficient to make it certain that the visual signals will receive prompt attention. One side of this buzzer is connected with the wire 15. The other side is connected to ground through the switch 88 and the armature 89 of pilot relay 43. Thus, when the switch 88 is closed, the buzzer operates whenever a signal is sent to the main-office from a substation.

From the foregoing description, it will be understood that the attendant at the main-office in answering signals from substations need never be concerned to deter-

mine the identity of the signaling substation. All the attendant needs to do is to note when a signal is set, then operate his key to cut out the signal and, if need be, communicate thereby with the substation. If a substation line has been changed from its usual spring-jack connection at the main-office, it is of no consequence to the main-office attendant. These spring-jack connections are all interchangeable so that any substation line may be connected with any set or set-portion at the main-office.

What is claimed and what is desired to be secured by Letters Patent is:—

1. In a telegraph system, the combination of a plurality of main-office multiplex sets or set-portions; a signal at the main-office associated with each set or set-portion; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions; and devices at the substations for operating said signals, the transmission instruments being operable independently of said signals.

2. In a telegraph system, the combination of a plurality of main lines terminating at a main-office; a multiplex set at the main-office adapted for connection with each of said main lines; a signal at the main-office associated with said main-office set; a substation line connecting with the main-office and adapted for connection with said main-office set; and means at the substation for operating said signal, the transmission instruments being operable independently of said signals.

3. In a telegraph system, the combination of a plurality of main lines terminating at a main-office; a plurality of main-office multiplex sets or set-portions adapted for connection with said main lines; a signal at the main-office associated with each set or set-portion; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions; and devices at the substations for operating said signals, the transmission instruments being operable independently of said signals.

4. In a telegraph system, the combination of a main line terminating at a main-office; a substation line connecting with the main-office; switching devices at the main-office for connecting said substation line with said main line and thereby forming a connected line; a signal at the main-office and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a locking relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; and a signaling switch in the substation line adapted to operate said locking relay and thereby operate said signal.

5. In a telegraph system, the combination of a main line terminating at a main-office; a substation line connecting with the main-office; a multiplex set and switching devices at the main-office for connecting said substation line with said main line through the multiplex set, and thereby forming a connected line; a signal at the main-office associated with said multiplex set and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a locking relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; and a signaling switch in the substation line adapted to operate said locking relay and thereby operate said signal.

6. In a telegraph system, the combination of a main line terminating at a main-office; a substation line connecting with the main-office; switching devices at the main-office for connecting said substation line with said main line and thereby forming a connected line; a signal at the main-office and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a locking relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; a signaling switch in the substation line adapted to operate said locking relay and thereby operate said signal; and a main-office device adapted to restore said relay and signaling circuit to normal condition.

7. In a telegraph system, the combination of a main line terminating at a main-office; a substation line connecting with the main-office; a multiplex set and switching devices at the main-office for connecting said substation line with said main line through the multiplex set, and thereby forming a connected line; a signal at the main-office associated with said multiplex set and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a locking relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; a signaling switch in the substation line adapted to operate said locking relay and thereby operate said signal; and a main-office device adapted to restore said relay and signaling circuit to normal condition.

8. In a telegraph system, the combination of a plurality of main-office multiplex sets or set-portions; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions to form a plurality of connected lines; a signal at the main-office associated with each multiplex set or set-portion and a signaling circuit therefor,

said signal being separate from the transmission instruments of the connected line; a relay associated with each connected line unresponsive to the working current in said line and controlling a signaling circuit; and a signaling switch in each substation line adapted to operate the connected relay and thereby operate its signal.

9. In a telegraph system, the combination of a plurality of main-office multiplex sets or set-portions; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions to form a plurality of connected lines; a signal at the main-office associated with each multiplex set or set-portion and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected lines; a locking relay associated with each connected line unresponsive to the working current in said line and controlling a signaling circuit; a signaling switch in each substation line adapted to operate the connected locking relay and thereby operate its signal; and a main-office switch associated with each multiplex set or set-portion adapted to restore the connected locking relay and associated signaling circuit to normal condition.

10. In a telegraph system, the combination of a plurality of main lines terminating at a main-office; a multiplex set at the main-office adapted for connection with each of said main lines; a substation line connecting with the main-office and adapted for connection with each of said main lines through said multiplex set to form a connected line; a signal at the main-office associated with said multiplex set and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a locking relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; and a signaling switch in each substation line adapted to operate the connected locking relay and thereby operate its signal.

11. In a telegraph system, the combination of a plurality of main lines terminating at a main-office; a multiplex set at the main-office adapted for connection with each of said main lines; a substation line connecting with the main-office and adapted for connection with each of said main lines through said multiplex set to form a connected line; a signal at the main-office associated with said multiplex set and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a locking relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; a signaling switch in each substation line adapted to operate the

connected locking relay and thereby operate its signal; and a main-office switch in said connected line adapted to restore said relay and signaling circuit to normal condition.

12. In a telegraph system, the combination of a plurality of main lines terminating at a main-office; a plurality of multiplex sets or set-portions adapted for connection with said main lines; a plurality of substation lines connecting with the main-office, each adapted for connection with each of the main lines through each set or set-portion to form a connected line; a signal at the main-office associated with each multiplex set or set-portion and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; and a signaling switch in each substation line adapted to operate the connected relay and thereby operate its signal.

13. In a telegraph system, the combination of a plurality of main lines terminating at a main-office; a plurality of multiplex sets or set-portions adapted for connection with said main lines; a plurality of substation lines connecting with the main-office, each adapted for connection with each of the main lines through each set or set-portion to form a connected line; a signal at the main-office associated with each multiplex set or set-portion and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected line; a locking relay associated with said connected line unresponsive to the working current in said line and controlling said signaling circuit; a signaling switch in each substation line adapted to operate the connected locking relay and thereby operate its signal; and a main-office switch in said connected line adapted to restore said relay and signaling circuit to normal condition.

14. In a telegraph system, the combination of a main line terminating at a main-office; a substation line connecting with the main-office; switching devices at the main-office for connecting said substation line with said main line and thereby forming a connected line; a signal at the main-office, said signal being separate from the transmission instruments of the connected line; a relay associated with the connected line unresponsive to the working current in said connected line and adapted to set said signal; and a signaling switch in the substation line adapted to operate said relay and thereby set the signal.

15. In a telegraph system, the combination of a main line terminating at a main-office; a substation line connecting with the main-office; switching devices at the main-office for connecting said substation line

with said main line and thereby forming a connected line; a signal at the main-office, said signal being separate from the transmission instruments of the connected line; a relay associated with said connected line unresponsive to the working current in said line and adapted to set said signal; a signaling switch in the substation line adapted to operate said relay and thereby set the signal; and means associated with said signal for restoring it to normal condition.

16. In a telegraph system, the combination of a main line terminating at a main-office; a substation line connecting with the main-office; a multiplex set and switching devices at the main-office for connecting said substation line with said main line through the multiplex set, and thereby forming a connected line; a signal at the main-office, said signal being separate from the transmission instruments of the connected line; a relay associated with said connected line unresponsive to the working current in said line and adapted to set said signal; a signaling switch in the substation line adapted to operate said relay and thereby set the signal; and means associated with said signal for restoring it to normal condition.

17. In a telegraph system, the combination of a plurality of main-office multiplex sets or set-portions; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions to form a plurality of connected lines; a signal at the main-office associated with each multiplex set or set-portion, said signal being separate from the transmission instruments of the connected line; a relay associated with each connected line unresponsive to the working current in said line; and a signaling switch in each substation line adapted to operate the connected relay and thereby set its signal.

18. In a telegraph system, the combination of a plurality of main-office multiplex sets or set-portions; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions to form a plurality of connected lines; a signal at the main-office associated with each multiplex set or set-portion, said signal being separate from the transmission instruments of the connected line; a relay associated with each connected line unresponsive to the working current in said line; a signaling switch in each substation line adapted to operate the connected relay and thereby set its signal; and a main-office switch associated with each multiplex set or set-portion and adapted to restore the connected relay and associated signal to normal condition.

19. In a telegraph system, the combination of a plurality of main-office multiplex sets or set portions; a visual signal at the

main-office associated with each set or set-portion; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-
 5 portions; devices at the substations for operating said signals; and a signal common to a plurality of said sets or set-portions and arranged to be operated coincidently with the operation of each visual signal asso-
 10 ciated with a member of such plurality of sets or set-portions, said signal being separate from the transmission instruments of the connected line.

20. In a telegraph system, the combina-
 15 tion of a plurality of main-office multiplex sets or set-portions; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions to form a plurality
 20 of connected lines; a visual signal at the main-office associated with each multiplex set or set-portion and a signaling circuit therefor, said signal being separate from the transmission instruments of the connected
 25 line; a locking relay associated with each connected line unresponsive to the working current in said line and controlling a signaling circuit; a signaling switch in each substation line adapted to operate the con-
 30 nected locking relay and thereby operate its signal; and an audible signal common to a plurality of said sets or set-portions and arranged to be operated coincidently with the operation of each visual signal asso-
 35 ciated with a member of such plurality of sets or set-portions.

21. In a telegraph system, the combina-
 40 tion of a plurality of main-office multiplex sets or set-portions; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions to form a plurality
 45 of connected lines; a visual signal at the main-office associated with each multiplex set or set-portion, said signal being separate from the transmission instruments of the connected line; a relay associated with
 50 each connected line unresponsive to the working current in said line; a signaling switch in each substation line adapted to operate the connected relay and thereby set its signal; and an audible signal common to
 55 a plurality of said sets or set-portions and arranged to be operated coincidently with the operation of each visual signal associated with a member of such plurality of sets or set-portions.

22. In a telegraph system, the combina-
 60 tion of a plurality of main-office multiplex sets or set-portions; a plurality of substation lines connecting with the main-office and adapted for connection with said main-office sets or set-portions to form a plurality of
 65 connected lines; a visual signal at the main-office associated with each multiplex set or

set-portion, said signal being separate from the transmission instruments of the connect-
 ed line; a relay associated with each connect-
 ed line unresponsive to the working current
 in said line; a signaling switch in each sub-
 station line adapted to operate the connect-
 ed relay and thereby set its signal; a main-
 office switch associated with each multiplex
 set or set-portion and adapted to restore the
 connected relay and associated signal to nor-
 mal condition; and an audible signal com-
 mon to a plurality of said sets or set-por-
 tions and arranged to be operated coinci-
 dently with the operation of each visual sig-
 nal associated with a member of such plu-
 rality of sets or set-portions.

23. In a telegraph system, the combina-
 tion of a plurality of main lines terminating
 at a main-office; a plurality of multiplex
 sets or set-portions adapted for connection
 with said main lines; a plurality of sub-
 station lines connecting with the main-office,
 each adapted for connection with each of
 the main lines through each set or set-por-
 tion to form a connected line; a visual sig-
 9 nal at the main-office associated with each
 multiplex set or set-portion and a signaling
 circuit therefor, said signal being separate
 from the transmission instruments of the
 connected line; a locking relay associated
 9 with said connected line unresponsive to
 the working current in said line and con-
 trolling said signaling circuit; a signaling
 switch in each substation line adapted to
 operate the connected locking relay and
 10 thereby operate its signal; an audible signal
 common to a plurality of said sets or set-
 portions and arranged to be operated coinci-
 dently with the operation of each visual
 signal associated with a member of such
 10 plurality of sets or set-portions; and a main-
 office switch in said connected line adapted
 to restore said visual and audible signals to
 normal condition.

24. In a telegraph system, the combina-
 11 tion of a plurality of main lines terminating
 at a main-office; a plurality of substation
 lines connecting at the main-office with said
 main lines; a signal at the main-office asso-
 ciated with each connected line, said signal
 11 being separate from the transmission instru-
 ments of the connected line; devices at the
 substations for operating said signals; and
 a main-office signal common to a plurality
 of such connected lines and arranged to be
 12 operated coincidently with each individual
 signal associated with a member of such plu-
 rality of connected lines.

25. In a telegraph system, the combina-
 12 tion of a plurality of main lines terminating
 at a main-office; a plurality of substation
 lines connecting at the main-office with said
 main lines; a signal at the main-office asso-
 ciated with each connected line, said signal
 being separate from the transmission instru-
 13

ments of the connected line; a relay associated with each connected line unresponsive to the working current in said line and controlling the associated signal; a device in
 5 each substation line adapted to operate the connected relay and thereby operate its signal; and a main-office signal common to a plurality of such connected lines and arranged to be operated coincidently with each
 10 individual signal associated with a member of such plurality of connected lines.

26. In a telegraph system, a central station and a main line; a substation; a substation line connected to the main line at the
 15 central station; a signal associated with the connected line at the central station and being initially unresponsive to telegraph current, said signal being separate from the transmission instruments of the connected
 20 line; and means at the substation for operating the signal, said signal being thereafter maintained in operation by telegraph current.

27. In a telegraph system, a central station and a main line; a substation; a substation line connected to the main line at the
 25 central station; a signal associated with the connected line at the central station and being initially unresponsive to telegraph current, said signal being separate from the transmission instruments of the connected
 30 line; means at the substation for operating the signal; and a relay associated with said connected line to maintain the signal in set
 35 condition under the influence of the telegraph current.

28. In a telegraph system, a central station and a main line; a substation; a substation line connected to the main

line at the central station; a signal
 40 associated with the connected line at the central station and being initially unresponsive to telegraph current, said signal being separate from the transmission
 45 instruments of the connected line; means at the substation for operating the signal, said signal being thereafter maintained in operation by telegraph current; and an audible signal at the central station arranged to
 50 operate coincidently with said first mentioned signal.

29. A telegraph office; a main line and a substation line connected at said office; a signal at the office and an energizing circuit therefor, said signal being separate
 55 from the transmission instruments of the connected line; a locking relay associated with the line unresponsive to working current; and means associated with the substation line for operating the locking relay.
 60

30. A telegraph office; a main line and a substation line connected at said office; a signal at the office and an energizing circuit therefor, said signal being separate from
 65 the transmission instruments of the connected line; a locking relay associated with the line unresponsive to working current; means associated with the substation line for operating the locking relay; and a switch at said
 70 office to restore the signal to normal condition.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM E. ATHEARN.

Witnesses:

H. W. DRAKE,
 BEATRICE MIRVIS.