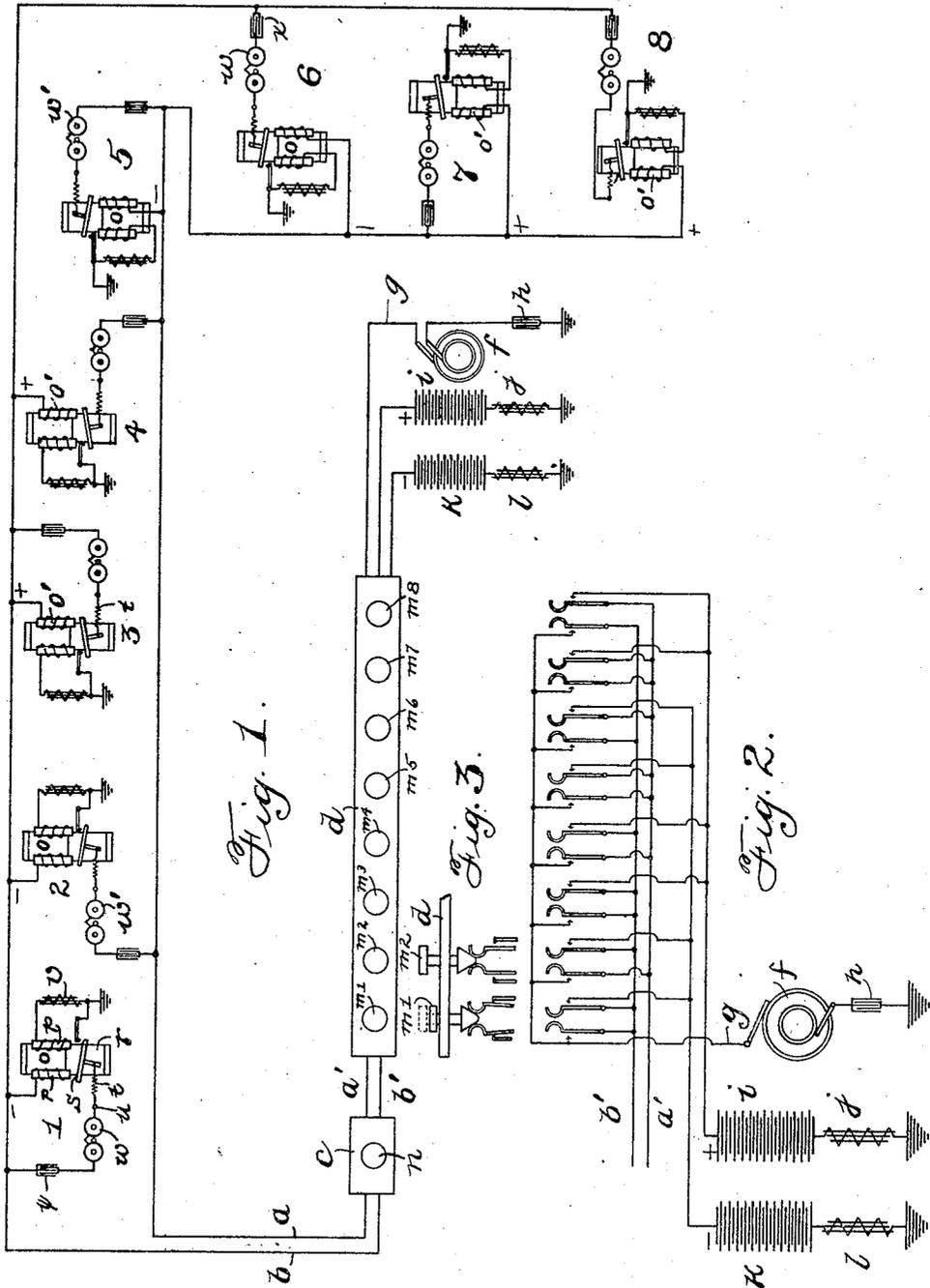


M. W. ZABEL.
 SELECTIVE SIGNALING SYSTEM.
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956,255.

Patented Apr. 26, 1910.



WITNESSES:

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SELECTIVE SIGNALING SYSTEM.

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Specification of Letters Patent.

Patented Apr. 26, 1910.

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To all whom it may concern:

Be it known that I, MAX W. ZABEL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Selective Signaling Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to selective signaling, and has for its object the provision of a new selective ringing system which shall be simple in its operation, and which shall be accurate and positive in its action.

More particularly, my invention relates to a system of electric signal transmission, and has for its object to provide a system of this kind and apparatus for its operation, in which a line or lines of wire may be used over which a plurality of independent and selective call signals may be sent simultaneously or simultaneously as desired.

The prime object of the invention thus resides in the provision of apparatus in conjunction with a communicating electrical connection, of such character that the number of electrical communicating connections may be greatly reduced below the actual number of selective calls that may be transmitted over said electrical connection. In other words, my invention contemplates the connection to a metallic electric line, of a plurality of call signals and apparatus to be associated with said line, to cause said signals to respond selectively.

I will explain my invention more particularly by reference to the accompanying drawing, illustrating the application of my invention in a preferred form, in which,

Figure 1 is a general diagrammatic view of my improved signaling system; Fig. 2 is a view showing the key connections more in detail; and Fig. 3 is a broken view of part of the selective key.

Like characters of reference indicate like parts throughout the different figures.

Referring more particularly to Fig. 1, I have shown a plurality of substations 1, 2, 3, 4, 5, 6, 7 and 8, all associated with the two limbs a , b , of a metallic signaling line. A ringing key c , is used to control the continuity of the limbs a and b , the key serving in the capacity of a ringing key analogous to that used in telephone switchboards.

The limbs a' and b' enter a second key d which acts in the capacity of a selective key, as will be more fully set forth hereinafter, and connect said key to the key c .

An alternating current generator f has one of its terminals connected by means of the wire g to springs in the key d , while the remaining terminal of the generator is connected through a suitable condenser h to the ground. A battery or other source of direct current i has its positive terminal connected to springs in the key d , while the negative terminal is grounded through an impedance coil j . Likewise a battery k has its negative terminal connected to springs in said key, and has its positive terminal grounded through an impedance coil l . I have here shown two batteries for clearness of illustration, but of course one could be used alone to give both positive and negative current.

The key d is provided with buttons m^1 , m^2 , m^3 , m^4 , m^5 , m^6 , m^7 , m^8 , as shown more clearly in the broken view of Fig. 3. These buttons, when depressed, each serve to actuate springs associated therewith, and thereby cause a connection of generator or battery current, or both, to either of the limbs a' and b' , or both, which lead from the key d to the key c . An actuation of the handle n of the key c , will effect a closing of the limbs a' , b' with the limbs a and b respectively, as is well understood. Thus when button m^1 is depressed, the negative pole of the battery k is connected to the limb b' , as is also the pole of the ringing generator f . Now when key c is actuated, the signal at station 1 will respond, as will be more fully set forth hereinafter. When button m^2 is depressed and m^1 released, the negative pole of the battery k is again connected to the limb b' , but the ringing generator f is connected to the other limb a' . An actuation of the key c will now cause station 2 to respond.

Button m^3 when actuated causes both ringing generator and positive pole of the battery i to be connected to limb b' ; button m^4 causes the connection of positive battery to limb b' and ringing current to limb a' ; button m^5 causes the connection of both ringing current and negative battery to limb a' ; button m^6 causes the connection of negative battery to limb a' and ringing current to limb b' ; button m^7 causes the connection of positive battery and ringing current

to limb a' ; and finally, button m^8 causes the connection of positive battery to limb a' and ringing current to limb b' .

The great advantage of including a condenser h in the circuit of the ringing generator f , will be now apparent, as this condenser prevents the flow of the direct battery current through the generator when both are connected to the same limb. Likewise do the impedance coils l and j prevent the alternating or other non-continuous ringing current from flowing through the batteries to any extent when both battery and ringing current are on the same limb.

I will now explain, in a preferred form, the construction and arrangement of the substation apparatus which is selectively responsive to the various combinations and applications of the actuating currents.

Each of the stations 1, 2, 5 and 6 is provided with a selector o preferably taking the form of a polarized device having actuating coils p , p , and a directing magnet r . A vibrating armature s is associated with and under the influence of the coils p , p . A spring t under tension and held by a post u , holds the armatures in all of the stations 1, 2, 5 and 6, to one side so that said armatures will only respond when current from a negative source is impressed on the coils p , p , due to the influence of the magnet r . An impedance coil v is connected in series with each selector o to prevent alternating or other ringing current from affecting the operation of the selector. The armature s is adapted, when actuated, to close a contact by means of which at stations 1 and 6 an electrically operated signal bell w is connected between the limb b and ground. A condenser x is included in series with the bell w , and prevents direct current such for instance as that sent out by the batteries k and i , from operatively actuating said bell. The selector o at station 1, as stated, connects the bell w between the limb b and ground, while the selector o at station 2 connects the call bell w' between the limb a and ground, through the contact provided upon the armature s of said selector. Thus when negative direct battery current is sent out on the limb b , both selectors o at stations 1 and 2, are actuated, and both call bells w and w' are included in circuits, said circuits being independent. Now, then, when ringing current from the generator f is sent out on either limb a or b to ground, as is done by means of the buttons in the key d , either bell w or w' will respond, depending upon whether button m^1 or m^2 is depressed. At stations 5 and 6 the selectors o are connected between the limb a and the ground, and they will be actuated only when negative battery current is impressed on the limb a by means of buttons m^5 and m^6 . These selectors o again connect bells w and w' into independ-

ent circuits, and the call bells w and w' at the stations 5 and 6 respectively will respond, depending upon whether the ringing current is sent out on either limb a or b .

The selectors o' , o' at stations 3, 4, 7 and 8 are similarly constructed, except that the springs t associated with said armatures, are mounted upon the opposite side, so that, due to the polarization of the electromagnets associated with these selectors, it requires positive battery current to operate them, and they will remain unresponsive when negative current is impressed on either circuit. Thus when the selectors o , o at stations 1 and 2 operate due to negative battery current on the line, the selectors o' , o' remain quiet, and when selectors o' , o' operate due to positive current on the limb b , selectors o , o remain quiet. In like manner are the selectors at stations 5, 6, 7 and 8 operated,—that is, two selectors operate each time, and these two selectors each connect a call bell between the ground and one or the other of the limbs of the metallic circuit, and these two bells which are connected each time, are operated selectively by means of having the ringing current from the generator f sent out on either limb a or b to the ground. The battery current, or a direct current, will not affect the call signals, as condensers are included in their circuits; and the ringing currents will not affect the selectors, as impedance coils are connected in their circuits. Thus by depressing either one of the eight buttons of the selective key, and then operating the button on the ringing key c , either one of the eight stations will respond, depending upon which of the selective buttons was depressed.

In the specification I have used the word signal generally as descriptive of the bells with their hammer in connection with the co-related operating coils and armature. It is clear that I do not limit myself to this precise form of signal, inasmuch as the signal controlling means which in this case comprise the coils and armature, can be used to operate or control any other suitable kind of proximate or remote signal.

My invention, of course, is applicable in many forms, and variations may readily be made without departing from the spirit of the invention. Thus it is readily seen that sixteen stations could be given selective service by the use of two selectors at each station, connected between opposite sides of the line to ground, and I therefore do not wish to limit myself to the precise construction and arrangement as herein shown and set forth. But

Having thus described my invention, I claim as new and desire to secure by Letters Patent the following:

1. A selective signaling system comprising two electrical line conductors, a plurality

of pairs of signal receiving stations associated with said line conductors, and a signal sending station, each station of each pair of signal receiving stations having an electrically operated signal and a selector to control the connection of the signals to the line conductor aforesaid, the two selectors of each pair being connected to the same line conductor and the two signals of each pair being adapted for operative connection individually to different line conductors aforesaid, together with operating devices at the sending station to selectively operate the selectors in pairs and simultaneously to selectively operate either of the signals when thus connected.

2. A selective signaling system comprising two electrical line conductors, a plurality of pairs of signal receiving stations associated with said line conductors, and a signal sending station, each station of each pair of signal receiving stations having an electrically operated signal and a selector to control the connection of the signals to the line conductor aforesaid, the two signals of each pair being adapted for connection individually to different line conductors aforesaid, together with operating devices at the sending station to selectively operate the selectors in pairs, and simultaneously to operate either of the connected electrically operated signals.

3. A selective signaling system comprising two electrical line conductors, a plurality of sets of signal receiving stations associated with said line conductors, and a signal sending station, each station of each set of signal receiving stations having an electrically operated signal and a relay to control the connection of the signal to the line conductors aforesaid, different signals of each set being adapted for connection individually to different line conductors aforesaid, together with operating devices at the sending station to selectively operate the relays in sets and simultaneously to selectively operate either of the signals when thus connected.

4. A selective signaling system, comprising two electrical conductors for uniting substations and a central station, polarized selectors at each substation, operating means at the central station to selectively operate selectors connected to the same line conductor, electrically operated signals at each substation under the control of the selectors, current supplying means at the central station to operate the signals and circuit controlling mechanism to connect the signals associated with simultaneously operated relays to different electrical conductors whenever their associated selectors are operated, substantially as described.

5. A selective system, comprising substations and an exchange connected by a metallic line, a polarized selector at each sub-

station, a magneto call signal under the control of each selector, and current supplying means at the exchange for operating the call signals and at the same time operating the polarized selector, the signal and the selector receiving current from the same electric circuit, substantially as described.

6. A selective signaling system, comprising a plurality of electrical conductors, selectors associated with said conductors, electrically operated signals, circuit controlling devices controlled by the selectors interposed between the conductors and the signals, electric devices for selectively operating selectors connected to the same electrical conductors, and devices for selectively operating signals associated with simultaneously operated selectors and connected thereby to different line conductors, substantially as described.

7. A selective signaling system, comprising two conductors, a plurality of selectors associated with different conductors, electric means for selectively operating selectors connected to the same conductor, and electrically operated signals associated with each of said selectors and operatively connected to different line conductors by selectors associated with like line conductors, substantially as described.

8. A selective signaling system, comprising two conductors, a plurality of polarized selectors associated with different conductors, electric means at a signal sending station for selectively operating these selectors, electrically operated signals associated with each of said selectors and operatively connected to different conductors by selectors connected to the same line conductor, and current supplying means at the sending station for operating the signals, substantially as described.

9. A selective signaling system, comprising two conductors, a plurality of polarized selectors associated with different conductors, means for operating the selectors connected to the same line conductor in pairs, and electrically operated signals associated with each of said selectors and selectively connected by said selectors to different conductors, substantially as described.

10. A selective signaling system, comprising two conductors, a plurality of polarized selectors associated with different conductors, means at a signal sending station for operating the selectors connected to the same line conductor in pairs, electrically operated signals associated with each of said selectors and selectively connected by said selectors to different conductors, and electric means at the signal sending station for operating said electrical signals, substantially as described.

11. A selective signaling system, comprising two conductors, a plurality of polarized

selectors, electric devices at a signal sending station for operating selectors connected to the same line conductor in groups, electrically operated signals associated with said selectors, switching means controlled by said selectors for connecting said signals to different conductors selectively, and current supplying means at the sending station for operating said signals, substantially as described.

12. A selective signaling system comprising two electrical line conductors, two signal receiving stations, a signal sending station, each signal receiving station having a relay and a signal, the two relays connected to the same line conductor, one signal also being adapted for connection to the same line conductor and the other signal being adapted for connection to the other line conductor, connecting means whereby the relays control the aforesaid connection of the signals, current supplying means at the signal sending station for simultaneously operating both relays, and generating devices for furnishing current of different character to at the same time selectively operate either signal.

13. A selective signaling system comprising two electrical line conductors, two signal receiving stations, a signal sending station, each signal receiving station having a relay and a signal, the two relays connected to the same line conductor, one signal also being adapted for connection to the same line conductor and the other signal being adapted for connection to the other line conductor, connecting means whereby the relays control the aforesaid connection of the signals, current supplying means at the signal sending station for simultaneously operating both relays, and at the same time selectively operating either signal and means for preventing interference between signal and relay when operatively connected to the same conductor.

14. A selective signaling system comprising two electrical line conductors, two signal receiving stations, a signal sending station, each signal receiving station having a relay and a signal, the two relays connected to the same line conductor, one signal also being adapted for connection to the same line conductor and the other signal being adapted for connection to the other line conductor, connecting means whereby the relays control the aforesaid connection of the signals, current supplying means at the signal sending station for simultaneously operating both relays, and at the same time selectively operating either signal and reactive means for preventing interference between signal and relay when operatively connected to the same line conductor.

15. A selective signaling system comprising two electrical line conductors, two sig-

nal receiving stations, a signal sending station, each signal receiving station having a relay and a signal, the two relays connected to the same line conductor, one signal also being adapted for connection to the same line conductor and the other signal being adapted for connection to the other line conductor, connecting means whereby the relays control the aforesaid connection of the signals, current supplying means at the signal sending station for simultaneously operating both relays, and at the same time selectively operating either signal and a condenser for preventing interference between signal and relay when operatively connected to the same line conductor.

16. A selective signaling system comprising two electrical line conductors for uniting a central station with sub-stations, a relay at each sub-station, said relays being allotted to different line conductors, operating means at the central station for selectively operating relays connected to the same line conductor in pairs, a signal associated with each relay, switching means under the control of said relays whereby signals associated with a group of relays are simultaneously operatively connected to unlike line conductors when said group of relays is operatively actuated, an operating device at the central station for furnishing current to either line conductors for selectively operating signals when thus connected.

17. A selective signaling system, comprising four signaling stations united by means of line conductors with the exchange, of means in metallic bridge between a line conductor aforesaid and a return circuit at each signal receiving station for connecting the signals thereat to a line conductor, all the signals being adapted for operation with substantially the same character of alternating current furnished at the central station, and current supplying means for furnishing the operating current.

18. A selective signaling system, comprising a signal-sending station, two line conductors for connecting said signal-sending station with a plurality of receiving stations, a relay and a signal at each signal-receiving station, the signal at each signal-receiving station normally disconnected from the line conductors, each relay being in a metallic grounded bridge connection, switching means for connecting some of the signals to the same line conductor with their associated relay, the relays being adapted to operate with direct current and the signals being adapted to operate with undulatory current, said relays and signals being mechanically separate, current supplying means at the signal-sending station to operate the signals and the relays, reactive means associated with the relays to prevent the sig-

nal-operating current from operating the relays, and reactive means associated with the signals for preventing the relay-operating current from objectionably influencing the signals.

19. A selective signaling system, comprising a signal sending station, two line conductors for connecting said signal sending station with a plurality of receiving stations, a relay and a signal at each signal receiving station, the signal at each signal receiving station normally disconnected from the line conductors, switching means for connecting some of the signals to the same line conductor with their associated relay, the relays being adapted to operate with direct current and the signals being adapted to operate with undulatory current, current supplying means at the signal sending station to operate the signals and the relays, re-active means associated with the relays to prevent the signal-operating current from objectionably influencing the relays, and re-active means associated with the signals for preventing the relay-operating current from objectionably influencing the signals.

20. A selective signaling system, comprising a signal sending station, two line conductors for connecting said signal sending station with a plurality of receiving stations, a relay and a signal at each signal receiving station for connecting signals to line conductors aforesaid, the signal at each signal receiving station normally disconnected from the line conductors, switching means for connecting some of the signals to the same line conductor with their associated relay, the relays being adapted to operate with direct current and the signals being adapted to operate with undulatory current, current supplying means at the signal sending station to operate the signals and the relays, re-active means associated with the relays to prevent the signal-operating current from objectionably influencing the relays, and re-active means associated with the signals for preventing the relay-operating current from objectionably influencing the signals.

21. A selective signaling system, comprising a signal sending station, two line conductors for connecting said signal sending station with a plurality of receiving stations, a relay and a signal at each signal receiving station for connecting signals to line conductors aforesaid, the signal at each signal receiving station normally disconnected from the line conductors, switching means at the sending station for operating the relays in pairs and for selectively operating the signals thus operatively connected when a pair of relays is operated, each pair of relays being connected to the same line conductor and serving to connect their associated signals to different line conductors, the relays

being adapted to operate with direct current, and the signals being adapted to operate with undulatory current, current supplying means at the signal sending station to operate the signals and the relays, re-active means associated with the relays to prevent the signal-operating current from objectionably influencing the relays, and re-active means associated with the signals for preventing the relay-operating current from objectionably influencing the signals.

22. A selective signaling system, comprising two conductors, a plurality of polarized selectors associated with different conductors, electric means at a signal sending station for selectively operating these selectors, an electrically operated signal operating device associated with each of said selectors and operatively connected to different conductors by selectors connected to the same line conductor, and current supplying means at the sending station for operating the signal operating devices, substantially as described.

23. A selective signaling system, comprising a signal sending station, two line conductors and a return circuit and two signal receiving stations each having a relay and signal operating device, together with switching means at the sending station for operating both relays simultaneously and at the same time operating the signal operating device selectively and each of said relays being connected in a metallic continuous bridge between said conductors and a return circuit, a signal and relay of one station being connected to the same line conductor.

24. A selective signaling system, comprising a signal sending station, two line conductors for connecting said signal sending station with a plurality of receiving stations, a relay at each signal receiving station the signal operating device at each signal receiving station normally disconnected from the line conductors, switching means for connecting some of the signal operating devices to the same line conductor with their associated relay, the relays being adapted to operate with direct current and the signal operating devices being adapted to operate with undulatory current, re-active means associated with the relays to prevent the signal-operating current from objectionably influencing the relays, and re-active means associated with the signals for preventing the relay-operating current from objectionably influencing the signal operating devices.

25. A selective signaling system, comprising two conductors, a plurality of polarized selectors associated with different conductors, means at a signal sending station for operating the selectors connected to the same line conductor in pairs, electrically operated signal operating devices associated with each of said selectors and selectively connected

by said selectors to different conductors, and current supplying means at the sending station for operating the signal operating devices substantially as described.

5 26. A selective signaling system, comprising two conductors, a plurality of polarized selectors associated with different conductors, means at a signal sending station for operating the selectors connected to the same
10 line conductor in pairs, electrically operated signal operating devices associated with each of said selectors and selectively connected by said selectors to different conductors, and electric means at the signal sending station
15 for operating said electrical signal operating devices, substantially as described.

27. A selective signaling apparatus comprising an electromagnetic signal, adapted for connection to a signaling circuit, a relay
20 to govern said connection responsive to direct current, and an impedance coil in series with said relay to prevent the actuation of said relay by alternating current.

25 28. A selective signaling system comprising two electrical line conductors, four sig-

nal receiving stations associated with said line conductors, a signal sending station, each station having a signal controlling device responsive to undulatory current, and a relay connected to a line conductor and a
30 return circuit in a metalically continuous bridge for operatively connecting said signal controlling device to a line conductor aforesaid, other than the one to which said
35 relay is connected, two of said relays and two of said signals aforesaid being allotted to each one of the line conductors aforesaid, means for operating selectively relays connected to the same line conductor from the
40 central station, said signal controlling devices being of such character as to be unresponsive to the currents which operate said relay.

In witness whereof, I hereunto subscribe my name this sixth day of February, A. D.,
45 1904.

MAX W. ZABEL.

Witnesses:

F. B. BOICE,
JOSEPH E. CONWAY.