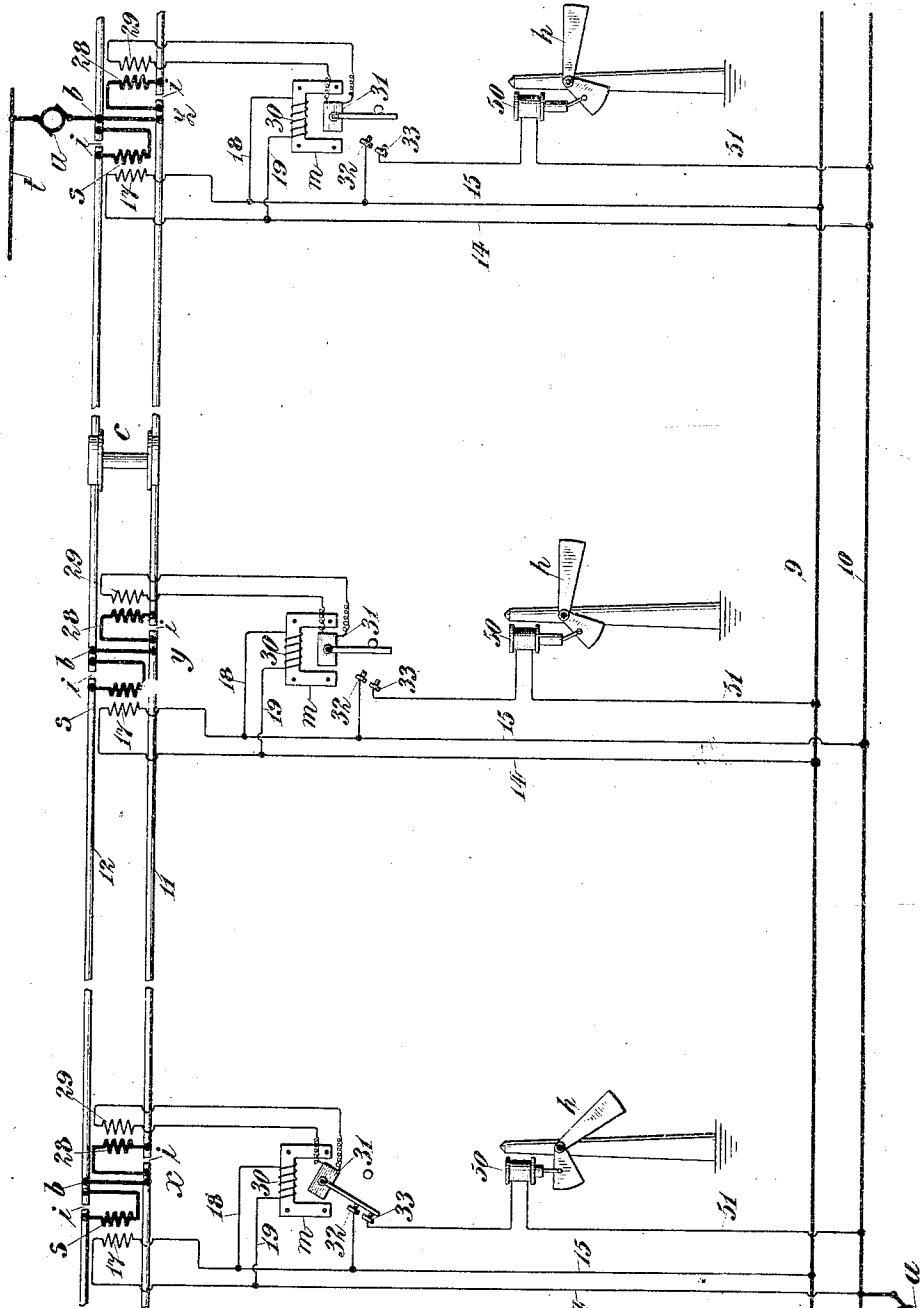


C. J. COLEMAN.
RAILWAY SIGNALING SYSTEM.
APPLICATION FILED JULY 10, 1908.

1,047,917.

Patented Dec. 24, 1912.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CLYDE J. COLEMAN, OF NEW YORK, N. Y., ASSIGNOR-TO THE HALL SWITCH AND SIGNAL COMPANY, A CORPORATION OF MAINE.

RAILWAY SIGNALING SYSTEM.

1,047,917.

Specification of Letters Patent.

Patented Dec. 24, 1912.

Application filed July 10, 1908. Serial No. 442,816.

To all whom it may concern:

Be it known that I, CLYDE J. COLEMAN, a citizen of the United States, residing in New York, county and State of New York, have invented certain new and useful Improvements in Railway Signaling Systems, of which the following is a specification.

My invention relates to railway signaling and has for its object the provision of an efficient and reliable automatic signaling system which may be used in connection either with electric or steam railroads.

My invention involves a novel arrangement of the signal controlling circuit with the source of signal controlling current and the electro-responsive device to be affected by the passage of the train to control the signals. In the ordinary signaling system the rails of the track are employed as the signal controlling circuit, a source of supply being connected across the rails at one point and an electro-responsive signaling controlling device being connected across the rails at another point. The electro-responsive device is deenergized by the presence of the train between it and the source inasmuch as the train short circuits the electro-responsive device. In this system the different signal controlling circuits, usually one for each block, are separated by insulating joints forming breaks in the track at the end of each block. When such a system is used for electric railroads it has been the practice to bridge these insulating joints with large and expensive inductance bonds to permit direct current or low frequency alternating current to be carried across the insulating joints while preventing more or less successfully the passage of a high frequency signal controlling current. In this system also the rails have been connected at intervals by similar inductance or reactance bonds to permit the equalization of the power current between the rails. In another system which I have shown and described in my application, Serial No. 383,366, filed July 12th, 1907, I have sectionalized the track by introducing bonds of negligible impedance at intervals connected across the rails and producing bonds of zero difference of potential between the rails, placing between each pair of bonds a source of supply connected across the rails. In this system the electroresponsive device is placed in operative relation to the current flow in the rails where adjacent

to the bond. In said application I specifically show an electro-responsive device in inductive relation to the rails. My present invention retains the use of these bonds as a means of sectionalizing the track, but I supply the signal controlling current to the circuit between each pair of bonds by making a break in one of the rails of the track and connecting said source across said break so as to supply the electro-motive-force of the source to the adjacent ends of the same rail. Preferably I place this break in the rail closely adjacent to one bond and I preferably supply a similar break in one or other of the rails at a point closely adjacent to the other bond. These insulating breaks are not necessary in order to sectionalize the track, this being done by the bonds, but provide a means by which the entire current supplied by the source of signal controlling current may be utilized in an electro-responsive device, and whereby but a single electro-responsive device need be provided for each section. This is because the source being connected across the break in one rail instead of across the track as heretofore, may be placed as closely adjacent to a bond as is desired. It is not material to the invention that the breaks be arranged one in each rail of the section. Moreover, it is not material to my invention in its broader phase that the rails of the track be used as the conductors for the signaling current. If the railroad is an electric one a source of power current may be supplied, one pole thereof being connected to the two rails in parallel. In this case the cross bonds form a desirable means of equalizing the power current in the two rails.

The accompanying drawing illustrates the invention.

11, 12, are the rails which may be connected in parallel to direct current generator *u*, the other pole of which is connected to a trolley wire *t*. Bonds *b* connect opposite rails of the track and divide the track electrically into a series of signal sections *w*, *y* and *z*. In the present embodiment of the invention the points of interrupted conductivity or breaks *i* are provided at opposite ends and in opposite relays of said circuit. They are insulating points and are sometimes called break points in the circuit. To supply alternating current for signaling there may be a separate generator for each signal

section, but I prefer an alternating current supply circuit like 9, 10, containing an alternating generator *a* with branch circuits 14, 15, in each of which is a primary coil 17 co-
 5 operating with a secondary coil *s* forming the source of alternating current for the signal circuit section. The opposite terminals of the secondary coils *s* are connected to one rail upon opposite sides of a break
 10 point *i*. At each end of a signal section I have shown a semaphore signal *h* with operating mechanism in the form of a solenoid magnet 50. Magnet 50 is in a circuit 15, 51,
 15 connected with the alternating supply circuit 9, 10. In circuit 15, 51 are break points 32, 33, in position to be opened and closed by the movable member 31 of a polarized relay *m*. The movable coil or armature of
 20 the relay *m* is in circuit with the coil 29 in cooperative relation with an inducing coil 28, the terminals of which are connected to the rail upon opposite sides of a break point
 25 *i*, at the opposite end of a signal section with respect to the source *s*. The fixed coil 30 of relay *m* is in a branch circuit 18, 19, with conductors 14, 15, connected to the alternating circuit 9, 10. It results from
 30 this that alternating impulses in the coil 30 and in coil 31 are one-half cycle apart because the impulses operating in coil 31 pass through the transformer 28, 29. In the signal
 35 section *a*, the current from the source *s* operating in the coil 28 causes the movable element 31 of relay *m* to close the circuit of magnet 50 at the point 32, 33. In the
 40 section *y* the car *c* on the track cuts out the coil 28, and electrically separates it from the source *s* of that section. The movable member 31 of the relay *m* of section *y* assumes
 45 its retracted position. The break points 32, 33, are open and the signal *h* goes to its danger indication. If a bond *b* be broken the current from adjacent sources produce a condition of no effective current
 50 in the intermediate track circuit and the signals show danger, provided that the track sources 28 are, as shown, oppositely connected in alternate blocks.

In making use of the terms, signal and
 55 signal system, it is not intended to suggest that the invention is limited to any particular type but it is to be understood that such terms are used to attain simplicity, and throughout the claims it is intended to include
 60 systems in which automatic apparatus is employed to operate alarms and set switches or act upon a train circuit or other apparatus in such a manner as to automatically give warning to an operator or train guard to enable him to control the movement
 of the cars.

While I have shown one specific embodiment of my invention and described the same in detail, I desire it to be understood
 35 that modifications may be made therein by

those skilled in the art without departing from the principle of my invention as set forth in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. In a railway signaling system, a pair
 of conductors, means for sectionalizing the
 same to form a series of successive circuits,
 a break in one of the conductors of each
 circuit, sources of signal controlling current
 each arranged to apply its electro-motive-
 force across one of said breaks, a second
 break in one of the conductors of each cir-
 70 cuit, and electro-responsive devices each arranged to receive the electro-motive-force
 across one of the latter breaks. 75
2. In a railway signaling system, the
 track rails, means for sectionalizing the
 same to form a series of successive circuits,
 a break in one of the rails of each circuit,
 sources of signal controlling current each
 80 arranged to apply its electro-motive-force across one of said breaks, a second break in
 one of the rails of each circuit, and electro-responsive devices each arranged to receive
 the electromotive-force across one of the
 85 latter breaks. 90
3. In a railway signaling system, a pair
 of conductors, bonds connecting the same at
 intervals, two breaks in the circuit between
 each successive pair of bonds, means for ap-
 95 plying an electro-motive-force across one of
 each said two breaks, and an electro-respon-
 sive device connected across each of the
 other said two breaks. 100
4. In a railway signaling system, the
 track rails, bonds connecting the same at in-
 tervals, two breaks in the circuit between
 each successive pair of bonds, means for ap-
 105 plying an electro-motive-force across one of
 each said two breaks, and an electro-respon-
 sive device connected across each of the
 other said two breaks.
5. In a railway signaling system, a signal
 controlling circuit comprising a section of
 110 the railway track and signaling current con-
 ducting bonds connecting the rails of the
 track at each end of the section, a break in
 the circuit at one end thereof, a source of
 signal controlling current connected across
 115 the same, and an electro-responsive device
 in operative relation with the circuit at the
 other end thereof.
6. In a railway signaling system, a signal
 controlling circuit including a section of
 120 the track and signaling current conducting
 bonds connecting the rails thereof at each
 end of the section, a break in a rail of the
 track, a source of signal controlling current
 connected across said break, and an electro-
 125 responsive device in operative relation with
 the track circuit.
7. In a railway, a signal current genera-
 tor and a generator of electricity of con-
 130 trasting characteristics, a circuit including

the rails connected to the latter generator, a series of metallic signal circuits each composed of electrically independent adjacent sections of said rails, a signal controlling coil having its terminals connected to a rail upon opposite sides of a break point near one end of a signal section, a source of signal current connected to a rail upon opposite sides of a break point at the other end of a signal section, and means whereby such a coil in each signal section circuit operates a signal.

8. In a railway signal, a signal section circuit consisting of the parallel rails of the track connected in series, a signal therefor, a break point in a rail at one end of the section, a break point in a rail at the other end of the section, a signal controlling coil bridging the first named break, a source of alternating current bridging the second named break, means whereby said coil controls the signal, a direct current generator and a circuit for said generator including said rails in parallel.

9. In a railway, the combination with the track rails of means for electric power distribution including the track rails as part of the power circuit, means for automatic signaling including bonds uniting opposite rails of the track at corresponding points in each signal section, insulating sections in each rail at opposite extremities of each signal section, a source of signaling current, having a different characteristic to that of the power current, connected to a rail of each signal section upon opposite sides of an insulating section and a signal controlling coil for each signal section having its terminals connected to a rail upon opposite sides of the other insulating section.

10. In a railway, the combination with the track rails of means for electric power distribution including said track rails as part of the power circuit and means for automatic signaling, consisting of bonds uniting opposite rails of the track at the terminals of signal sections, insulating sections in each rail at corresponding points of each signal section, a source of signaling current having a different characteristic to that of the power current, connections from the opposite poles of the signaling current source to a rail upon opposite sides of an insulating section in each signal section, signal controlling coils, one for each signal section, and connections from the terminals of said coils to opposite sides of an insulating section in each signal section.

11. In a railway, the combination with the track rails of means for electric power distribution and means for automatic signaling consisting of two generators having contrasting characteristics, the power generator included in circuit with the track rails and the signaling generator included

in circuit with a series of successive track signal circuits, each circuit consisting of a section of track rails, bonds connecting said rails at corresponding points in each signal section, discontinuous points in the conductivity of the track at corresponding points in each signal section and connections between the terminals of the signal generator and a rail on opposite sides of one of said points in each signal section, signal controlling coils, one for each signal section, and connections between the terminals of a coil and a rail upon opposite sides of the other of said points in each signal section.

12. In a railway, the combination with the track rails of means for electric power distribution thereon including a power generator connected to said track rails, and means for automatic signaling thereon including a generator of electricity of contrasting characteristics, bonds connecting opposite rails at corresponding points in each of a series of signal sections, points of interrupted conductivity in the track at opposite ends of each signal section, signal controlling coils, one for each section, connections between opposite terminals of the signal generator and a rail upon opposite sides of an interrupted point in each signal section and connections between opposite terminals of a signal controlling coil and a rail upon opposite sides of the other interrupted point in each signal section.

13. In a railway, the combination with the track rails of means for electric power distribution thereon including a direct current power generator connected to said track rails, means for automatic signaling on said railway including a generator of alternating impulses of electricity, bonds connecting opposite rails at corresponding points in each of the series of signal sections into which the track is divided, points of interrupted conductivity in the track at corresponding points in each signal section, signal controlling coils, one for each section, connections between opposite terminals of the alternating generator and a rail upon opposite sides of a point of interrupted conductivity in each signal section and connections between opposite terminals of a signal controlling coil and a rail upon opposite sides of the other point of interrupted conductivity.

14. In a block signal system, in combination with a railway having the rails of adjacent blocks separated by insulated joints, bonds between adjacent blocks each connecting a rail of one block with the diagonally opposite rail of an adjacent block, sources of current for the track circuits, track relays each having a supply conductor connected around one of said insulated joints, and signals controlled by said relays.

15. In a block signal system, in combina-

tion with a railway having the rails of adjacent blocks separated by insulated joints, sources of current connected to the rails, track relays each having a supply conductor connected around one of said insulated joints, and bonds connecting diagonally opposite rails of adjacent blocks and forming with the sources, rails, and relay supply conductors closed track circuits, said bonds be-

ing common to adjacent track circuits, and 10 signals controlled by said relays.

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

CLYDE J. COLEMAN.

Witnesses:

ANNA DALY,
EDWIN SEGER.