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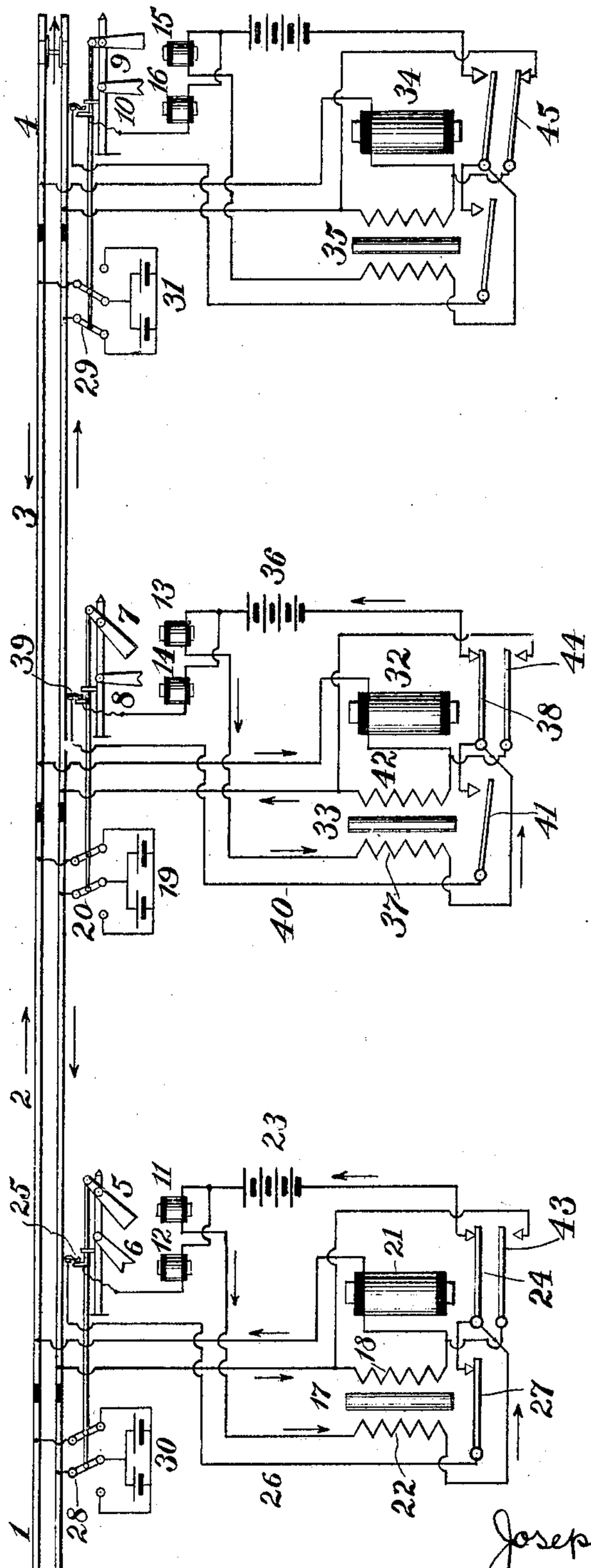
J. A. WILSON.

SIGNALING SYSTEM.

APPLICATION FILED SEPT. 13, 1904.



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No. 789,778. Patented May 16, 1905.

UNITED STATES PATENT OFFICE.

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SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 789,778, dated May 16, 1905.

Application filed September 13, 1904. Serial No. 224,233.

To all whom it may concern:

Be it known that I, JOSEPH A. WILSON, a citizen of the United States, whose permanent post-office address is Westfield, New Jersey, and whose temporary post-office address is Thirsk, county of Yorkshire, England, have invented certain new and useful Improvements in Signaling Systems, of which the following is a specification.

This invention relates to improvements in electric signaling systems for railways.

The invention seeks to provide an efficient and simplified arrangement of circuits and connections and such as is adapted to control and operate home and distant signals. The invention also seeks to provide an efficient and simple arrangement whereby a signal may be operated and controlled over two sections of track.

The invention also seeks to accomplish its various purposes without the use of polarized relays.

In the accompanying drawing two complete blocks of a system embodying the invention are shown diagrammatically.

Referring now to the drawing, 1, 2, 3, and 4 are successive blocks of the railway, each including a separate insulated track-section. 5 and 6 are the home and distant signals located at the entering end of block 2. 7 and 8 are the home and distant signals at the entering end of block 3. 9 and 10 are the home and distant signals at the entering end of block 4. In the present embodiment of the invention these signals are shown normally at "safety," although, of course, the invention contemplates an arrangement of signals normally at "danger."

11 and 12 are the clutch-magnets or other operating or controlling devices for the signals 5 and 6. 13 and 14 are corresponding operating or controlling devices for signals 7 and 8. 15 and 16 are corresponding operating or controlling devices for signals 9 and 10.

17 is a differential magnet located at the entering end of block 2. This magnet has two coils and is so arranged that when current traverses both coils in the same direction the magnet is energized and when current traverses the coils in the opposite directions the magnet is deënergized. Coil 18 of magnet 17 is included in the track-circuit of block 2. This track-circuit includes battery 19, current-reverser 20, rails of block 2, coil 18, and track-magnet 21. The current-reverser 20 is operated by a suitable connection with the home signal 7, so that when this signal is at "safety" current from battery 19 flows through the track-circuit in the direction indicated by the arrows, and when signal 7 is at "danger" current-reverser 20 is shifted, so that current from track-battery 19 flows in the opposite direction through the track-circuit. This current, through coil 18 of magnet 17, is made to coincide with or differ from the direction of current in the other coil of magnet 17. 22 is this other coil of magnet 17. It may be energized from any suitable source, but is preferably energized from the signal-circuit of signal 5. This circuit is as follows: from battery 23, clutch-magnet 11, coil 22, circuit-controller 24, and back to battery 23. The signal-circuit for distant signal 6 is from battery 23, clutch-magnet 12, circuit-controller 25, wire 26, circuit-controllers 27 and 24, back to battery 23. Circuit-controller 24 is operated by track-magnet 21, and circuit-controller 27 is operated by differential magnet 17. It will be seen that the signal-circuit for the distant signal 6 is controlled by both magnets 17 and 21 and that signal-circuit for home signal 5 is controlled by magnet 21.

28 and 29 are the current-reversers in the track-circuits associated with track-batteries 30 and 31 of blocks 1 and 3, respectively, and operated with home signals 5 and 9, respectively.

32 and 33 are the track-magnet and differential magnet associated with the circuits for block 3.

34 and 35 are the track-magnet and differential magnet associated with the circuits for block 4.

The signal-circuits for signals 7 and 8 are the same as those for signals 5 and 6 and may be traced as follows: from battery 36 through

magnet 13 for home signal 7, coil 37 of differential magnet 33, circuit-controller 38 operated by magnet 32, and back to battery. The signal-circuit for distant signal 8 is from battery 36 through clutch-magnet 14, circuit-controller 39, wire 40, circuit-controller 41 operated by differential magnet 33, circuit-controller 38 back to battery. The track-circuit of track-magnet 32 is the same as that for track-magnet 21 and includes battery 31, current-reverser 29, track-rails, coil 42 of magnet 33, and track-magnet 32. The circuits for clutch-magnets 15 and 16 associated with signals 9 and 10 and the track-circuit for block 4 are similar to those just described and need not be traced.

In the normal condition and when the signals are at "safety" current through both coils of a differential magnet flows in the same direction, so as to energize the magnet, as shown with reference to magnet 17.

The operation is as follows: A train entering block 2 shunts track-battery 19, thereby deënergizing coil 18 and magnet 21. Magnet 21 releases circuit-controller 24, thereby deenergizing clutch-magnets 11 and 12 and putting signals 5 and 6 to "danger" behind the train. When the train enters block 3, it puts signals 7 and 8 to "danger" in the same way. The movement of home signal 7 to "danger" shifts current-reverser 20, so that current through track-magnet 21 and coil 18 is reversed. This energizes magnet 21 and closes circuit-controller 24, so that clutch-magnet 11 is energized and signal 5 goes to "safety." The reversal of current in coil 18 deënergizes differential magnet 17, because it neutralizes current flowing in the opposite direction through coil 22. This circuit-controller opens to keep clutch-magnet 12 deënergized and distant signal 6 at "danger." When the train passes beyond block 3, home signal 7 returns to "safety," thereby restoring current from track-battery 19 through coil 18 to its normal direction, so as to energize magnet 17 and put distant signal 6 to "safety." When the train passes into block 4, it puts home and distant signals 9 and 10 to "danger" behind it and keeps distant signal 8 at "danger" in the manner already described.

43 is a circuit-controller connected in a shunt around coil 18 and operated by magnet 21, so that when this magnet is energized circuit-controller 43 will be opened and when the magnet is deënergized circuit-controller 43 will be closed. Thus when magnet 21 is first energized after the train has passed off of block 2 full current from track-battery 19 passes through magnet 21 and around coil 18. This serves to increase the efficiency of a track-battery in its work of lifting the circuit-controllers 24 and 43. 44 and 45 are circuit-controllers having a similar arrangement and associated, respectively, with magnets 32 and 34. Circuit-controllers 25 and 39 in the circuits of distant-signal clutch-magnets 12 and 14, respectively, are operated from the home signals 5 and 7, respectively. They are so arranged as to be closed at or about the time when the home signals reach safety position and are opened when the home signals go to "danger." Their purpose is to prevent the distant signal from going to "safety" until after its associated home signal has already reached or about reached "safety." It is not essential that the current-reverser be mechanically operated with the home signals themselves, although such arrangement is preferred. These current-reversers may be operated by any means controlled by the train in the section next in advance.

While the complete system and its various features are shown in what is believed to be the best arrangement, it will be understood that the various features of the invention may be considerably modified in their arrangement and association without departing from the scope of the invention.

What I claim, and desire to secure by Letters Patent, is—

1. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; and a signal controlled by both of said magnets.

2. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; and a signal-circuit having circuit-breakers operated by said magnets.

3. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; a signal controlled by both of said magnets; and another signal controlled by said track-magnet.

4. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; and home and distant signals located at the same point, the home signal being controlled by said track-magnet and the distant signal being controlled by both of said magnets.

5. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; a signal-circuit controlled by both of said magnets; and a signal-circuit controlled by the track-magnet.

6. In an electric signaling system, the combination of a differential magnet having two coils; a signal-circuit including one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet, said signal-circuit being controlled by said track-magnet; and a signal controlled by both of said magnets.

7. In an electric signaling system, the combination of a differential magnet having two coils; a signal-circuit including one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet, said signal-circuit being controlled by said track-magnet; and another signal-circuit controlled by both of said magnets.

8. In an electric signaling system, the combination of home and distant signals located at the same point; a differential magnet having two coils; a circuit for the home signal including one coil of said magnet; a track-circuit including the other of said coils, a current-reverser and a track-magnet, said circuit for the home signal being controlled by said track-magnet; and a circuit for the distant signal controlled by both of said magnets.

9. In an electric signaling system, the combination of a differential magnet having two coils and located near the entering end of a track-section; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a track-magnet and a current-reverser, said current-reverser being located near the exit end of said track-section; means controlled by a train in advance of said track-section for operating the current-reverser; and a signal controlled by both of said magnets.

10. In an electric signaling system, the combination of a differential magnet having two coils and located near the entering end of a track-section; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a track-magnet and a current-reverser, said current-reverser being located near the exit end of said track-section; means controlled by a train in advance of said section for operating the current-reverser; a signal controlled by both of said magnets; and another signal controlled by said track-magnet.

11. In an electric signaling system, the combination of a differential magnet having two coils and located near the entering end of a track-section; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a track-magnet and a current-reverser, said current-reverser being located near the exit end of said track-section; means controlled by a train in advance of said track-section for operating the current-reverser; and home and distant signals located at the entering end of said track-section, the home signal being controlled by said track-magnet, and the distant signal being controlled by both of said magnets.

12. In an electric signaling system, the combination of a differential magnet having two coils and located near the entering end of a track-section; a signal-circuit including one of said coils; a track-circuit including the other of said coils, a track-magnet and a current-reverser, said current-reverser being located near the exit end of said track-section; means controlled by a train in advance of said current-reverser; and a signal controlled by both of said magnets.

13. In an electric signaling system, the combination of a differential magnet having two coils and located near the entering end of a track-section; a signal-circuit including one of said coils; a track-circuit including the other of said coils, a track-magnet and a current-reverser, said current-reverser being located near the exit end of said track-section; means controlled by a train in advance of said track-section for operating said current-reverser; and home and distant signals at the entering end of said track-section, the home signal being controlled by said track-magnet, and the distant signal being controlled by both of said magnets.

14. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; a shunt connection around said other coil of the differential magnet adapted to be closed when the track-magnet is deënergized and to be opened when the track-magnet is energized; and a signal controlled by both of said magnets.

15. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; a shunt connection around said other coil of the differential magnet adapted to be closed when the track-magnet is deënergized and to be opened when the track-magnet is energized; and a signal-circuit having circuit-breakers operated by said magnets.

16. In an electric signaling system, the combination of a differential magnet having two coils; a source of current for energizing one of said coils; a track-circuit including the other of said coils, a current-reverser and a track-magnet; a shunt connection around said other coil of the differential magnet adapted to be closed when the track-magnet is deënergized and to be opened when the track-magnet is energized; a signal-circuit controlled by both of said magnets; and a signal-circuit controlled by the track-magnet.

17. In an electric signaling system, the combination of home and distant signals located

at the same point; a differential magnet having two coils; a circuit for the home signal including one coil of said magnet; a track-circuit including the other of said coils, a current-reverser and a track-magnet, said circuit for the home signal being controlled by said track-magnet; a shunt connection around said other coil of the differential magnet adapted to be closed when the track-magnet is deënergized and to be opened when the track-magnet is energized; and a circuit for the distant signal controlled by both of said magnets.

18. In an electric signaling system, the combination of a differential magnet having two coils and located near the entering end of a track-section; a source of current for energizing one of said coils; a track-circuit including the other of said coils; a track-magnet and a current-reverser, said current-reverser being located near the exit end of said track-section; means controlled by a train in advance of said track-section for operating the current-reverser; a shunt connection around said other coil of the differential magnet adapted to be closed when the track-magnet is deënergized and to be opened when the track-magnet is energized; and a signal controlled by both of said magnets.

19. In an electric signaling system, the combination of a differential magnet having two coils and located near the entering end of a track-section; a signal-circuit including one of said coils; a track-circuit including the other of said coils, a track-magnet and a current-reverser, said current-reverser being located near the exit end of said track-section; means controlled by a train in advance of said track-section for operating said current-reverser; a shunt connection around said other coil of the differential magnet adapted to be closed when the track-magnet is deënergized and to be opened when the track-magnet is energized; and a signal controlled by both of said magnets.

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

JOSEPH A. WILSON.

Witnesses:
R. WESTACOTT,
ALFRED NUTTING.