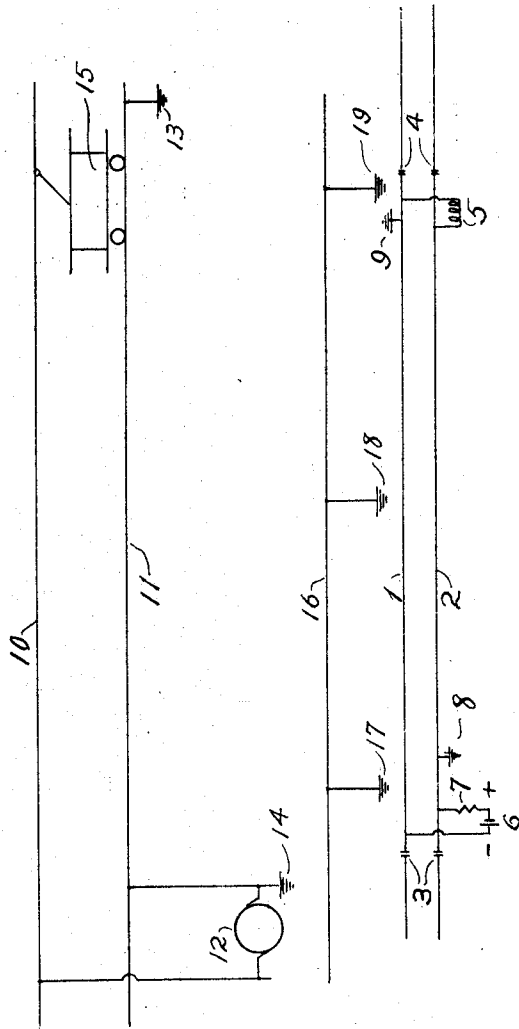


J. L. WOODBRIDGE.
RAILWAY SIGNAL SYSTEM.
APPLICATION FILED APR. 5, 1920.

1,368,530.

Patented Feb. 15, 1921.



WITNESS:

Thos. L. Mamm

INVENTOR.

J. Lester Woodbridge

UNITED STATES PATENT OFFICE.

JOSEPH LESTER WOODBRIDGE, OF PHILADELPHIA, PENNSYLVANIA.

RAILWAY SIGNAL SYSTEM.

1,368,530.

Specification of Letters Patent.

Patented Feb. 15, 1921.

Application filed April 5, 1920. Serial No. 371,555.

To all whom it may concern:

Be it known that I, JOSEPH LESTER WOODBRIDGE, a citizen of the United States, and a resident of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Railway Signal Systems, of which the following is a specification.

My invention relates to signal systems, in which the rails are used for carrying current to operate relays and other similar devices. It is found in certain locations where electric railways are operated in the vicinity of a steam railroad, that a part of the return current of the electric road passing through the earth on its way back to the source of power, causes serious interference with the operation of the signals of the steam railroad, a part of this return current being diverted from the earth to the railroad tracks and passing through the coils of the delicate signaling apparatus connected to the rails. The object of my invention is to neutralize the effect of such earth currents and to accomplish this purpose, I propose to provide a conductor running along the right-of-way of the railroad and connected to the ground at suitable points to equalize the ground potential. This, and other objects of the invention, will be more clearly understood by reference to the following description and accompanying drawing, which shows diagrammatically a railroad signaling system embodying my invention and an electric railroad system in proximity thereto, which might otherwise disturb the operation of the signals.

In the drawing, 1, 2, are the parallel rails of a railroad block, insulated from the rest of the track by the insulating joints, 3, 4, at either end of the block. 5 is the operating coil of a track relay or other similar device employed in connection with automatic signals. 6 is a battery or other source of electric current for operating the signal apparatus, and as here shown, the battery 6 is connected across the opposite rails, 1, 2, with a limiting resistance 7 in series therewith. Current from the battery will therefore flow from its positive terminal via 7, 2, 5 and 1, to the negative terminal, and this current passing through the coil will furnish the necessary excitation for actuating the relay or other device, except when a train is passing over the block, in which case the wheels and axles, bridging across the opposite rails

1 and 2, will short-circuit the coil 5, diverting the current therefrom and reducing its excitation to a negligible value. The details of the signaling devices are not shown as they form no part of the present invention and they may be any of the well known types in common use.

In a system such as described above, the attempt is made to keep the rails insulated from the ground, but it is not always possible to prevent partial grounds at certain points, such as highway intersections and station platforms. Such partial grounds are indicated in the drawing at 8 and 9.

Running parallel to the steam railroad is shown an electric railway whose trolley wire is indicated at 10 and track return at 11, the latter being grounded at 13 and 14. Current for the electric railway is furnished by the generator 12. A trolley car is shown at 15.

While the greater part of the current used by the trolley car 15, in returning to the source 12 will pass through the rails 11, a portion of this return current will leave the rail at 13, and pass through the earth to the ground connection 14. There will be a difference of potential between points in the earth in the vicinity of 13 and other points in the vicinity of 14, and if the points 9 and 8 where the steam railroad tracks are grounded are sufficiently near to the points 13 and 14 respectively, there will be a difference of potential between 9 and 8 caused by the return current of the electric road, as explained above. This difference of potential will cause a flow of current between 9 and 8 through coil 5 and rail 2, sufficient under certain conditions to interfere seriously with the normal operation of the signaling apparatus.

To avoid this interference, I provide a conductor 16, extending along the railroad tracks, supported in any suitable manner as on the customary telegraph poles, and grounded at intervals, as at the points 17, 18 and 19. The object of this conductor is to equalize the potential between points in the earth which might otherwise exhibit a difference of potential due to the leakage current from the electric road at locations where such difference of potential would interfere with the signals.

In order to carry out my invention to produce the desired results, the ground connections 17, 18 and 19 must be properly located

so that at least one of them will be located in the vicinity of each of the grounded portions of the tracks as at 8 and 9. It will be observed that the disturbance of the signals is due to the fact that the opposite rails 1 and 2 become connected respectively to points in the earth which have a difference of potential, due to the leakage currents. It would not be possible to obtain the desired results by connecting the equalizing conductors 16 to the opposite rails, as this would short circuit the relay coil 5 and prevent it from receiving current from the battery 6. If, however, the conductor 16 is grounded as shown at the points 17 and 19, in close proximity to the points 8 and 9 at which the rails are grounded, the difference of potential between the points 8 and 9 will be eliminated on account of the low resistance of conductor 16. The amount of leakage current sufficient to disturb the operation of the signals is ordinarily very small, and in order to divert this small amount of current and prevent it from disturbing the operation of the signals, the conductor 16 need not be very large and the cost of providing this protection against interference will be merely nominal.

Having described my invention, what I desire to secure by Letters Patent is:

1. In a railway signal system, the combination of an electric circuit including a section of the railroad track, electrically oper-

ated signal apparatus and its normal source of current connected to said circuit, and a conductor extending along said track and grounded at points adjacent thereto, as and for the purpose described.

2. In a railway signal system, the combination of a section of track, constituting a signal block, a battery connected across the opposite rails at one end of the block, signal apparatus connected across said rails at the other end of said block, and a conductor extending along the block and electrically connected to the ground at points adjacent to the track substantially as described.

3. In a railway signal system, the combination of a section of track constituting a signal block track circuit, a source of direct current connected across the opposite rails of said track circuit, signal apparatus connected across said opposite rails, a source of stray earth currents in the vicinity of said track circuit and a conductor extending along said track and connected to the earth at points adjacent to said rails, whereby said stray earth currents are diverted from said track circuit, substantially as described.

In testimony whereof I have duly executed these presents this twenty-third day of March, 1920.

J. LESTER WOODBRIDGE.

Witnesses:

WILLIAM G. ROGERS,
H. E. HUNT.