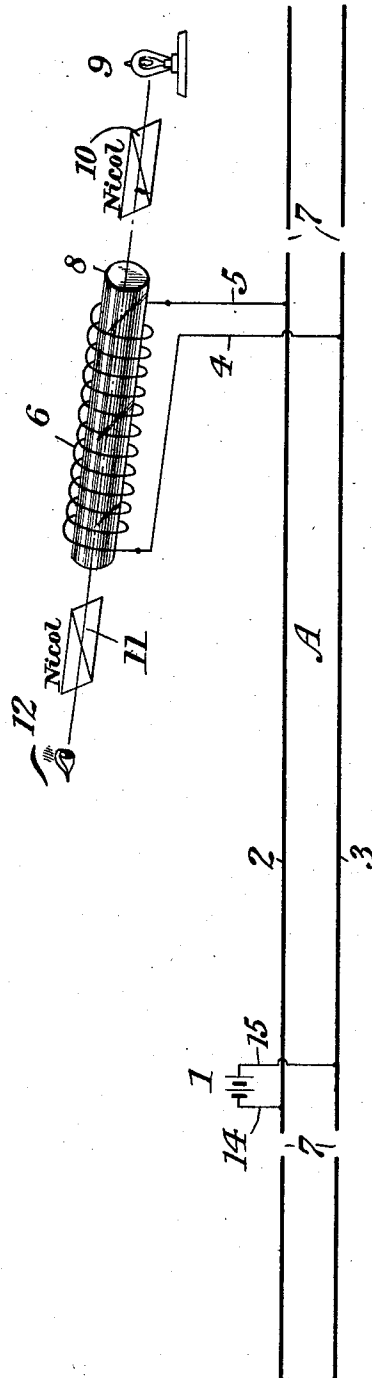


L. F. HOWARD.
RAILWAY SIGNALING.
APPLICATION FILED SEPT. 8, 1909.

1,009,309.

Patented Nov. 21, 1911.



Witnesses:
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UNITED STATES PATENT OFFICE.

LEMUEL F. HOWARD, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH AND SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

RAILWAY SIGNALING.

1,009,309.

Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed September 8, 1909. Serial No. 516,644.

To all whom it may concern:

Be it known that I, LEMUEL F. HOWARD, a citizen of the United States, residing at Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Railway Signaling Systems, of which the following is a specification.

My invention relates to indicating systems for use in railway signaling, and its object is to provide a novel means for giving the indication of the condition of a portion of a railway track as regards its occupancy by a train or car, by the use of an indicating device employing polarized light.

An indicating device embodying my invention may be used in a railway signaling tower or cabin, although I do not desire to limit myself to its use in any specific locality.

It is well known that if a beam of light be passed through a polarizing device, such for example as a Nicol's prism or a thin plate of glass, the beam will become polarized—that is, vibrations in only one plane will be transmitted. It is also well known that the plane of vibration of such a beam of polarized light may be rotated by passage through certain substances, for example, carbon bisulfid, when such substance is properly influenced by a magnetic field. It is evident, therefore, that if a tube of carbon bi-sulfid be placed in the path of a beam of polarized light, the carbon bi-sulfid being influenced by a magnetic field which is dependent upon the presence or absence of a car or train in a block section, and if the beam of light be then passed through an analyzing device which will indicate to the eye whether the plane of vibration has been rotated from its original plane, the condition of the block section as regards occupancy by a car or train may be observed.

I will described an indicating system embodying my invention, and will then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view illustrating a portion of a railway having applied thereto an indicating system embodying my invention.

Referring to the drawing, A is a block-section of a railway track, electrically insulated from the adjoining portions of the track in the usual and well-known manner, by means of insulated joints in one or both rails at points designated as

7. The rails of section A comprise a portion of a "track circuit" of the well-known type, which may be traced as follows: source of current 1, wire 14, rail 2, wire 5, coil of wire 6 around tube 8, wire 4, rail 3, wire 15, back to source of current 1. A lamp 9, shown as an incandescent electric lamp in the drawing, but which may be of any desired type of light, from which a beam of light passes through a polarizing device 10, herein shown as being a Nicol's prism. A tube 8 containing carbon bisulfid is placed in a line with the beam of polarized light issuing from the polarizer 10, and in the same line and beyond the tube 8 is placed an analyzing device 11 herein shown as being a Nicol's prism. The numeral 12 designates a human eye which may be placed in the line of the beam of light 13 passing through the entire apparatus. This lamp 9, polarizing device 10, tube 8 and analyzing device 11 may be located in a railway signaling tower or cabin, or in any locality in which it is desirable that the condition of the block section A may be observed. The eye 12 is preferably that of an operator in such a locality.

I have specified the tube 8 as containing carbon bisulfid, but any material may be used which, when influenced by a magnetic field, will rotate the plane of vibration of a beam of polarized light. I have shown the magnetic field as produced by means of a coil of wire 6 surrounding the tube, said coil being included in the track circuit above described. Any means may be used, however, for magnetically influencing the material in the tube 8 when the track section is unoccupied and the track circuit unbroken.

The arrangement of the parts of the polarizing system is as follows: The beam of light from the lamp 9 is polarized by the polarizing device 10, so that vibrations in only one plane are transmitted to the tube 8. When the substance in the tube 8 is not properly influenced magnetically, the plane of vibration of the beam is not rotated in its passage through the tube, hence it is transmitted to the analyzer 11 in the same plane in which it left the polarizer 10. The analyzer 11 is a polarizing device which will transmit polarized light whose vibrations are in one particular plane only, and it is so placed that it will not transmit the beam delivered to it as just described. When, 110

however, the substance in the tube 8 is properly influenced magnetically, the plane of vibration of the beam as it leaves the polarizing device is rotated in its passage through the tube, and the analyzer 11 is so placed that its plane of transmission corresponds with this new plane of vibration. Hence the beam 13 from the lamp 9 will be visible through the analyzer 11 when the tube 8 is properly influenced magnetically, but it will be invisible when the tube is not under proper magnetic influence.

The operation of the system embodying my invention as herein described is as follows: When the block section A is unoccupied, and the track circuit is unbroken, current from the source of current 1 will pass through the coil 6, producing a magnetic field through the tube 8, and the beam of light will then be visible through the analyzer 11, thus indicating a "clear" block section. When, however, a car or train shunts the current away from the coil 6, or when a broken rail or wire interrupts the flow of current in the track circuit, the beam of light becomes invisible through the analyzer 11, thus indicating a "danger" condition of the block section A.

In the drawing, I have shown the source of current 1 to be a direct current battery. In the present state of development of apparatus for polarizing light and rotating the plane of vibration, direct current would be preferable for supplying the magnetic field used to rotate the plane. Alternating current can be used, however, and in this case the rotation of the plane would be such as to produce light through the analyzer to give an indication, though the optical effect would be less intense on account of the fact that the value of the intensity of the light passing through the analyzer would vary practically according to a sine curve from zero to maximum.

Having thus described my invention, what I claim is:—

1. A railway indicating system comprising a railway block section, a track circuit formed in part by the rails of the block section, a source of light, means for polarizing a beam from said source, means controlled by the track circuit for rotating the plane of vibration of said polarized beam, and an analyzer comprising a polarizing device for receiving said beam.

2. A railway indicating system comprising a railway block section, a track circuit

formed in part by the rails of the block section, a source of light, a polarizing device for polarizing a beam from said source of light, means electrically controlled by the track circuit for rotating the plane of vibration of said polarized beam, and an analyzer comprising a polarizing device for indicating whether or not the plane of vibration of said beam has been rotated.

3. A railway indicating system comprising an insulated block section, a track circuit for said block section, a source of light, a polarizing device for polarizing a beam from said source of light, a substance located in the beam of polarized light and adapted when magnetically influenced to rotate the plane of vibration of said beam, a magnetic field for influencing said substance controlled by the track circuit, and a polarizing device located in the beam of light for indicating to the eye whether the plane of vibration of said beam has been rotated by said substance.

4. A railway indicating system comprising a track section, a track circuit formed in part by the rails of the block section, a source of light, a polarizing device adapted to polarize a beam from said source of light, a second polarizing device located in the line of the polarized beam of light and having its plane of transmission rotated through an angle from the plane of polarization of the first mentioned polarizing device, a substance interposed between the two polarizing devices and adapted when influenced magnetically to rotate the plane of vibration of the beam from the first polarizing device into the plane of transmission of the second polarizing device, and a magnetic field adapted to influence the said substance and controlled by the track circuit.

5. In combination with a block section of a railway, a source of light, a polarizing device for polarizing a beam from said source of light, means controlled by the condition of the block section as regards occupancy by a car or train for rotating the plane of vibration of the said polarized beam, and an analyzer comprising a polarizing device for receiving said beam.

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

LEMUEL F. HOWARD.

Witnesses:

J. B. STRUBLE,

D. J. MCCARTHY.

It is hereby certified that in Letters Patent No. 1,009,309, granted November 21, 1911, upon the application of Lemuel F. Howard, of Edgewood Park, Pennsylvania, for an improvement in "Railway Signaling," an error appears in the printed specification requiring correction as follows: Page 2, line 83, for the word "block" read *track*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of January, A. D., 1912.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.