D. J. McCARTHY.

CAB SIGNAL SYSTEM.

APPLICATION FILED MAY 19, 1908.

901,250.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

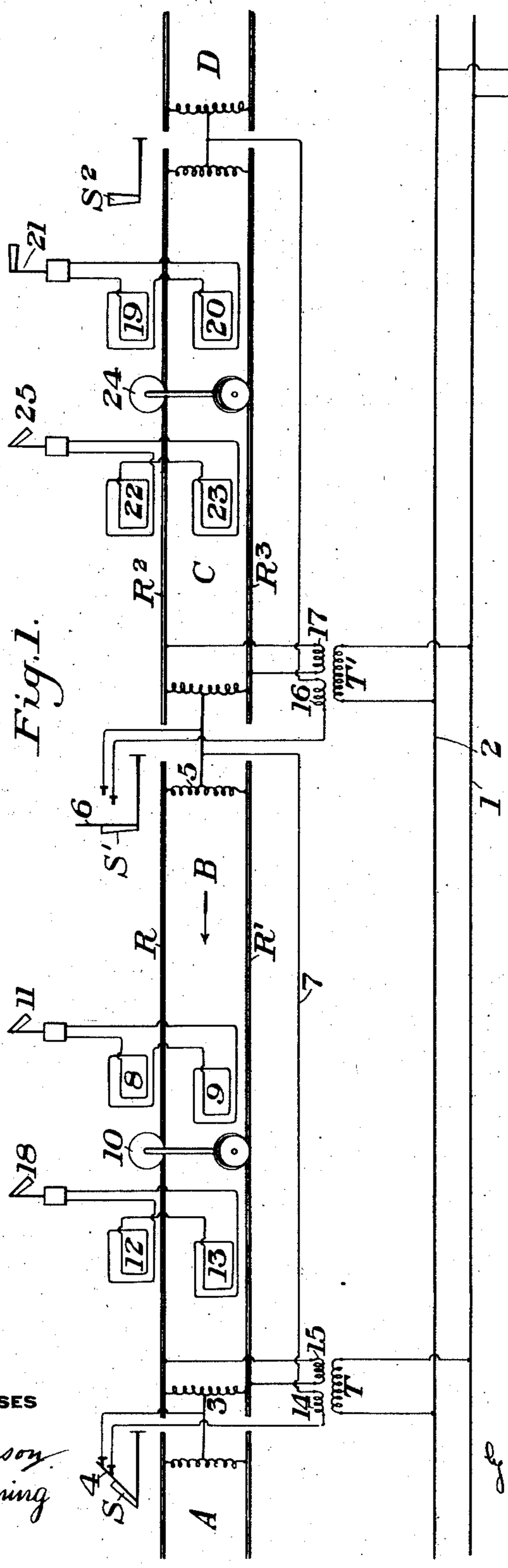

Fig. 1.

WITNESSES

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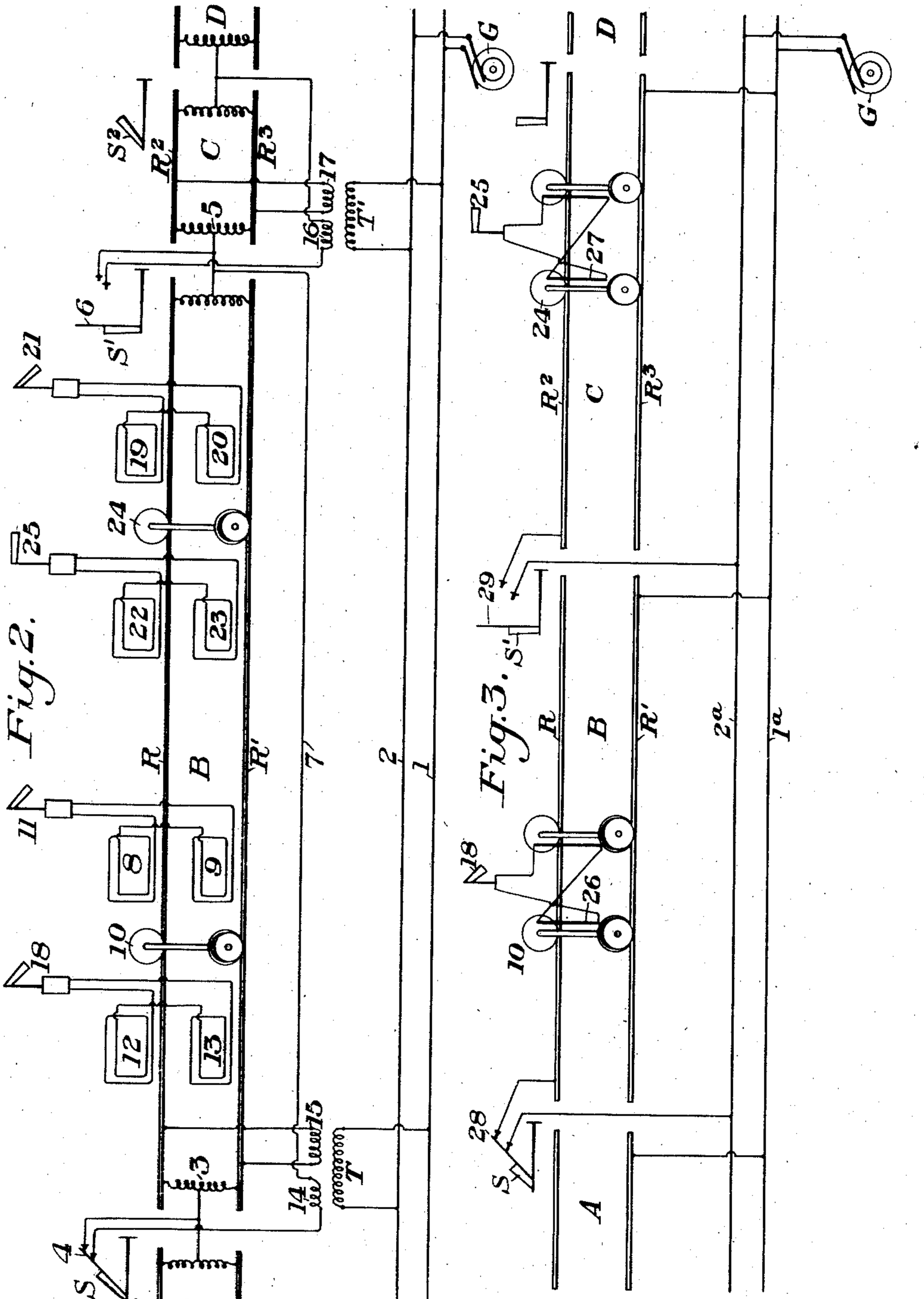

Fig. 2.

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

DANIEL J. McCARTHY, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CAB SIGNAL SYSTEM.

No. 901,250. Specification of Letters Patent. Patented Oct. 13, 1908.

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To all whom it may concern:

Be it known that I, DANIEL J. McCARTHY, of Wilkinsburg, Allegheny county, Pennsylvania, have invented a new and useful Cab Signal System, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagram illustrating one form of my invention; Fig. 2 is a similar view but with one of the trains or vehicles in a different position; and Fig. 3 is a diagram showing a modification.

My invention relates to a system of railway signaling in which the signals are placed upon the train and commonly known in the art as cab signaling.

The object of the invention is to provide a cab signaling system which can be used independently of or in conjunction with an automatic block signaling system; and which, when used in conjunction with such systems, will give an indication within the cab of a steam or electric locomotive or other vehicle of the condition of the signal in advance, and also of the block in which the locomotive is located. That is to say, it will indicate whether the signal in advance of the locomotive is in its clear or its danger position; and also if there is another locomotive, train or car in advance in the same block.

The precise nature of my invention will be best understood by reference to the accompanying drawings which will now be described; it being premised, however, that the system as there shown is susceptible of various modifications and changes by those skilled in the art without departing from the spirit and scope of the invention as defined in the appended claims.

Referring first to Figs. 1 and 2, the letters A, B, C and D designate successive block sections of a railway track. R, R′ designate the track rails of the block section B, and R^2, R^3 designate the track rails of the block section C. S is a semaphore or other track signal which guards the entrance to the block A; S′ is the signal which guards the entrance to the block B, and S^2 is the signal which guards the entrance to the block C. These signals may be operated by any of the well known systems.

1 and 2 are signal mains in which flows an alternating current supplied by a generator G. The frequency of this current can be of any value when the propulsion power for the cars or trains is other than an alternating current. When the propulsion power is alternating current, the frequency of the generator G is preferably of a value which is different from that of the propulsion current.

T is a transformer for supplying the block B, and T′ is a transformer for supplying the block C. Each of these transformers has one primary and two secondary coils or windings. The secondary coils of the transformer T are designated 14 and 15 and the secondary coils of the transformer T′ are designated 16 and 17. The primary coil of each transformer is connected across the signal mains 1 and 2. The secondary coil 14 of the transformer T is connected by one terminal to the middle point of the impedance coils 3 through a circuit breaker 4 which is controlled by the movement of the signal S. The other terminal of the coil or winding 14 is connected to the middle point of the impedance coils 5 at the opposite ends of the block B by a conductor 7. The impedance coils 3 and 5 may be the well known induction bonds which are used in block signaling on electric roads and which form a path for the propulsion current from one block section to another, but which serve to hold back the alternating signal current. The secondary coil 16 of the transformer T′ is in like manner connected by one terminal with the inductance bond 5 through a circuit breaker 6 controlled by the signal S′ and by its other terminal with the middle point of the bond at the opposite end of the block section C. The other secondary coils 15 and 17 are respectively connected across the track rails R, R′ and R^2, R^3 of the blocks B and C.

10 is a conventional representation of a train, car or vehicle which in Fig. 1 is shown within the block section B, and 24 is a similar representation of another train, car or vehicle which in Fig. 1 is shown as occupying the block section C. Each car, locomotive or other vehicle has thereon an inductor which is shown as consisting of two coils or windings which are placed in inductive relation to the respective track rails and included in the circuit of which is an indicating device. These two coils or windings are designated by the numerals 8 and 9 for the vehicle 10 and the corresponding signal is

indicated at 11. The similar coils or windings on the car or vehicle 24 are designated as 19 or 20 and the corresponding cab signal is indicated at 21. Each car or vehicle also carries another inductor which is shown as consisting of two coils in inductive relation to the track rails and including a signal or indicating device in either circuit. These two coils on the car or vehicle 10 are indicated by the numerals 12 and 13 and the corresponding signal is indicated at 18. The corresponding coils or windings on the car or vehicle 24 are designated as 22 and 23 and the cab signal operated thereby is indicated at 25. These cab signals may be either visual or audible signals, or both, and their operative mechanism is electro-responsive to the current generated in their circuits by the inductors.

The secondary coil 14 or 16 causes a current to flow through the track rails of the corresponding block and through the wire or conductor 7 when the signal S or S′ is in clear position so that the corresponding signal-controlled circuit breaker 4 or 6 is in closed position. The coils of those inductors which operate the cab signals 11 and 21 are so connected that the current induced in them by currents from these secondary coils 14 and 16 will flow through the inductors 11 and 21 and will cause them to indicate a condition corresponding to the position of the signals S, S′. Thus in Fig. 1, the signal S′ is in its clear position and a current is therefore flowing in the track rails from the secondary winding 14. The current induced in the coils 8 and 9 will therefore cause the cab signal 11 to indicate a clear position as shown. The signal S′, however, is at danger position and therefore no current is flowing into the rails R^2, R^3 from the secondary 16 of the transformer T′. The cab signal 21 indicates a corresponding danger position.

The signals indicated at 18 and 25 are operated by a current flowing in the track rails from the secondaries 15 and 17. In the position of the train or vehicle 10 as shown in Fig. 1, the circuit of the coil 15 is from one terminal through one rail to the locomotive or other vehicle 10 and thence through the axle thereof to the opposite rail and back to the other terminal of the said winding. The coils 12 and 13 are so connected that no current will flow in them by the current from the secondary coil 14, but a current will flow in them due to the current from the secondary coil 15. So long, therefore, as there is no car or train between the locomotive 10 and the signal S the indicator 18 will indicate a clear position. In the same way the indicator 25 will show a clear condition of the track so long as there is no train or other vehicle between the train or vehicle 24 and the signal S′. Suppose, however, that the train or vehicle 24 has moved into the block B beyond the danger signal S′ as shown in Fig. 2. The signal S being clear, current will be flowing along the rails R, R′ and as there is no difference of potential between the rails for this current the locomotives 10 and 24 will have no effect upon it so that the indicators 11 and 21 will show clear. The coils 12 and 13 will be energized in the same manner as in Fig. 1. The coils 22 and 23 will, however, not be energized owing to the shunting of the current from them through the axles of the locomotive 10 so that the signal 25 will indicate that there is another car or train in advance in the same block.

In block signaling systems, the signals are usually so constructed and arranged that any derangement of the controlling circuits will cause the signals to indicate danger. To prevent delays of traffic from such causes, it is customary for the train that has been stopped by a danger signal to wait a certain length of time and if the signal does not change within this time, to proceed under caution to the next signal. By the system here described, the indicators 18 and 25 will in all such cases indicate the presence of any other train or vehicle in advance in the same block.

Supposing the signal S′ to have failed in the danger position and the locomotive or other vehicle 10 to have passed out of the blocks A and B so that the signal S is at clear position, the locomotive 24 in passing into the block B will have its indicators 25 and 21 show clear, thereby indicating that no other train or car is in that block and that the signal S is clear. Therefore the locomotive 24 need not proceed under caution, thus saving time and also giving a positive indication that the signal S′ is out of order.

Fig. 3 shows another form of the invention in which the inductors 26 and 27 which operate the cab signals or indicators 18 and 25 are placed parallel with and in such relation to the axles of the locomotive that when an alternating current flows through the axles, an electro-motive force will be induced in these conductors, thereby causing a current to flow through the indicators 18 and 25. The line wire 2^a is connected to the rails R, R^2 of the blocks B and C through the circuit breakers 28 and 29 controlled by the track signals S, S′. The line wire 1^a is connected directly to rails R′, R^3 at opposite ends of the blocks B and C.

Signal S being in the clear position, a current is flowing from the line wire 2^a through the rail R, through the axles of the locomotive or other vehicle 10 and through rail R′ back to the line wire 1^a. As stated above this causes a current to flow through the indicator 18 which will indicate a clear position corresponding to the signal S. The sig-

nal S′ being in the danger position and circuit breaker 29 being open no current will be flowing through rails R^2, R^3 from the line wires 1^a and 2^a so that the indicator 25 on the locomotive or other vehicle 24 will not be energized and will indicate a danger position corresponding to the signal S′.

The advantages of my invention result from the simple arrangement of circuits whereby the principle of induction may be utilized to operate the cab signals indicating the condition of the track and of the track signals in the manner described.

I claim:—

1. In a cab signaling system, sectional track rails, track signals, means for supplying current to the track rails controlled by the movement of the track signals, an inductor carried by the vehicle and arranged to have a circuit induced therein by current flowing in the track circuit and a signal device on the vehicle which is responsive to current generated by the inductor; substantially as described.

2. In a cab signaling system, sectional track rails, track signals, means for supplying current to the track rails controlled by the movement of the track signals, an inductor carried by the vehicle and arranged in inductive relation to an axle thereof, and a signal device on the vehicle responsive to current generated by the inductor; substantially as described.

3. In a cab signaling system, an indicator in the cab or other vehicle for indicating the condition of an advance track signal, a second indicator for indicating the condition of the track of that block irrespective of the position of the track signals, track circuits, and means carried by the vehicle and operated from the track circuits for operating said indicators; substantially as described.

4. In a cab signaling system, sectional track rails, track signals, means for supplying current to the track rails controlled by the movement of the track signals, an indicator on the cab or other vehicle arranged to be operated by the current controlled by the movement of the track signals, a second indicator on the cab or other vehicle and a second track circuit for operating the last-named indicator; substantially as described.

5. In a cab signaling system, sectional track rails, transformers for supplying currents to the track rails, each of said transformers having two secondary coils or windings connected to the track rails, track signals, circuit breakers controlled by the track signals for controlling the supply of current from one of the transformer secondaries, indicating means on the cab or other vehicle and inductors carried by the vehicle and arranged to have current induced in them by currents flowing in the track circuits for operating the indicator; substantially as described.

6. In a cab signaling system, sectional track rails, transformers for supplying currents to the track rails, each of said transformers having two secondary windings connected to the track rails, track signals, circuit breakers controlled by the track signals for controlling the supply from one of the transformer secondaries to the track rails, two different indicators carried by the cab or other vehicle, and an inductor for operating each of said indicators, each of said inductors arranged to have a current induced therein by the current flowing from one of the transformer secondaries; substantially as described.

7. In a cab signaling system, the combination with sectional track rails and inductive bonds connecting the different blocks or sections, of transformers having secondary coils whose opposite terminals are connected to the inductive bonds at opposite ends of the corresponding blocks or sections, cab signals or indicators and inductors carried by the cab or other vehicle and arranged to be operated by the current supplied by said secondaries, together with track signals and circuit breakers operated thereby for controlling the circuits of said secondaries; substantially as described.

8. In a cab signaling system, the combination with sectional track rails, of transformers for supplying current to said rails, each of said transformers having two secondary coils or windings, one of the secondary coils or windings of each transformer being connected directly across the track rails, and the other of said coils or windings of each transformer being connected by its opposite terminals with both track rails at opposite ends of the corresponding block or section, together with signaling or indicating mechanism on the cabs or other vehicles responsive respectively to currents flowing in said rails from the two coils or windings of the transformer; substantially as described.

In testimony whereof, I have hereunto set my hand.

DANIEL J. McCARTHY.

Witnesses:
A. L. Vencill,
R. L. Kistler.