

No. 981,635.

PATENTED MAR. 10, 1908.

D. P. THOMSON.
CAB SIGNAL SYSTEM.
APPLICATION FILED AUG. 2, 1907.

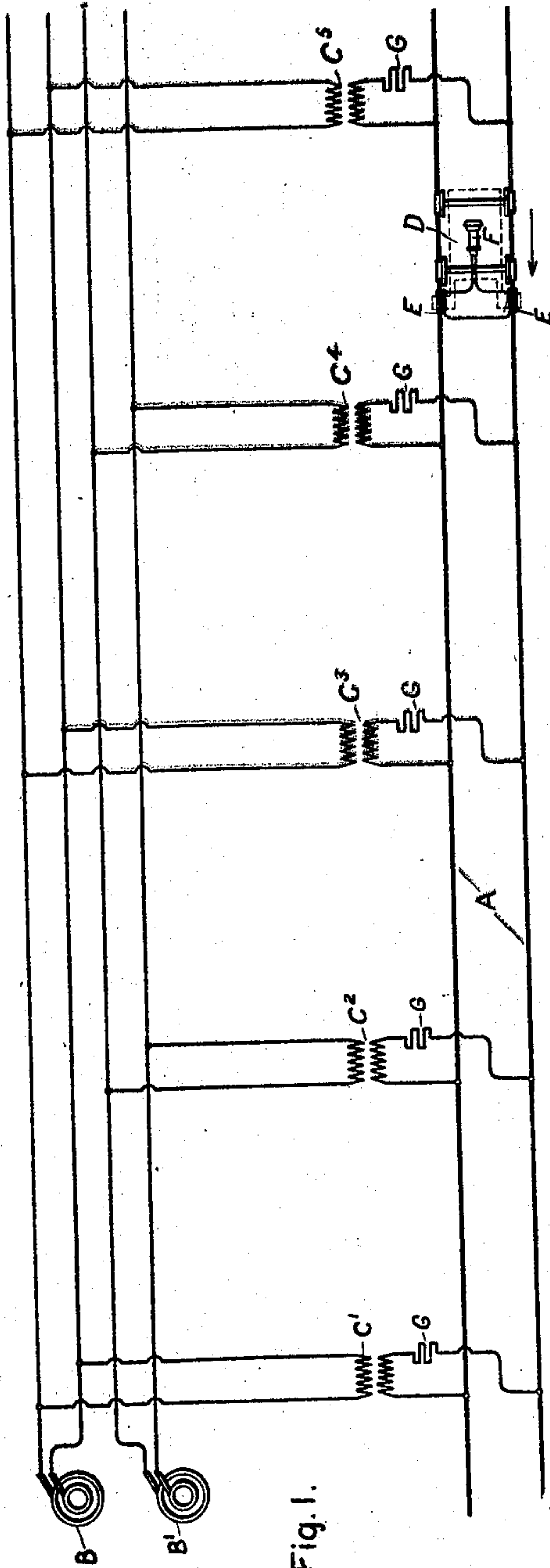


Fig. 1.

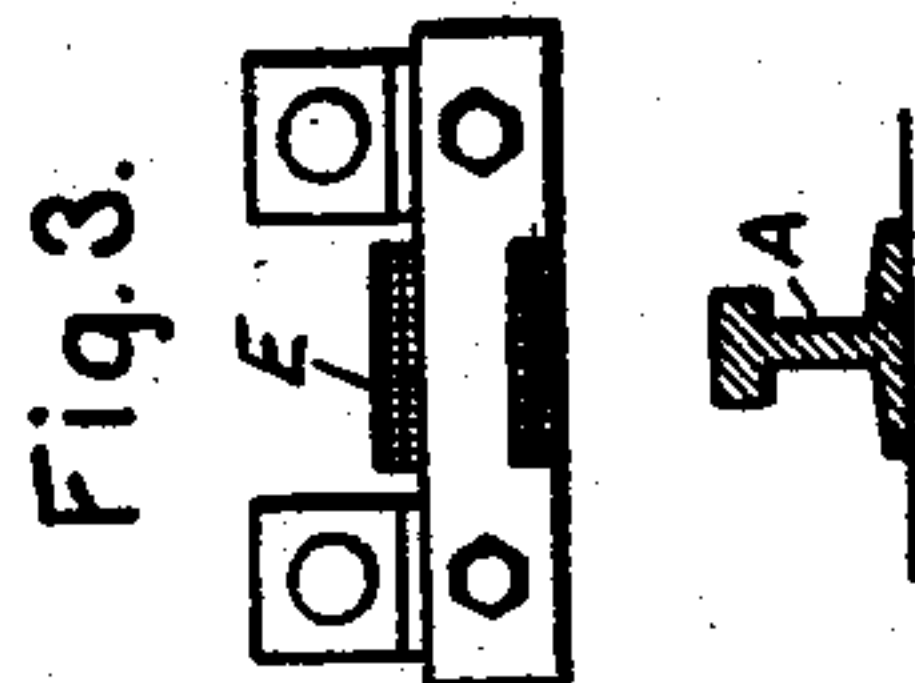


Fig. 3.

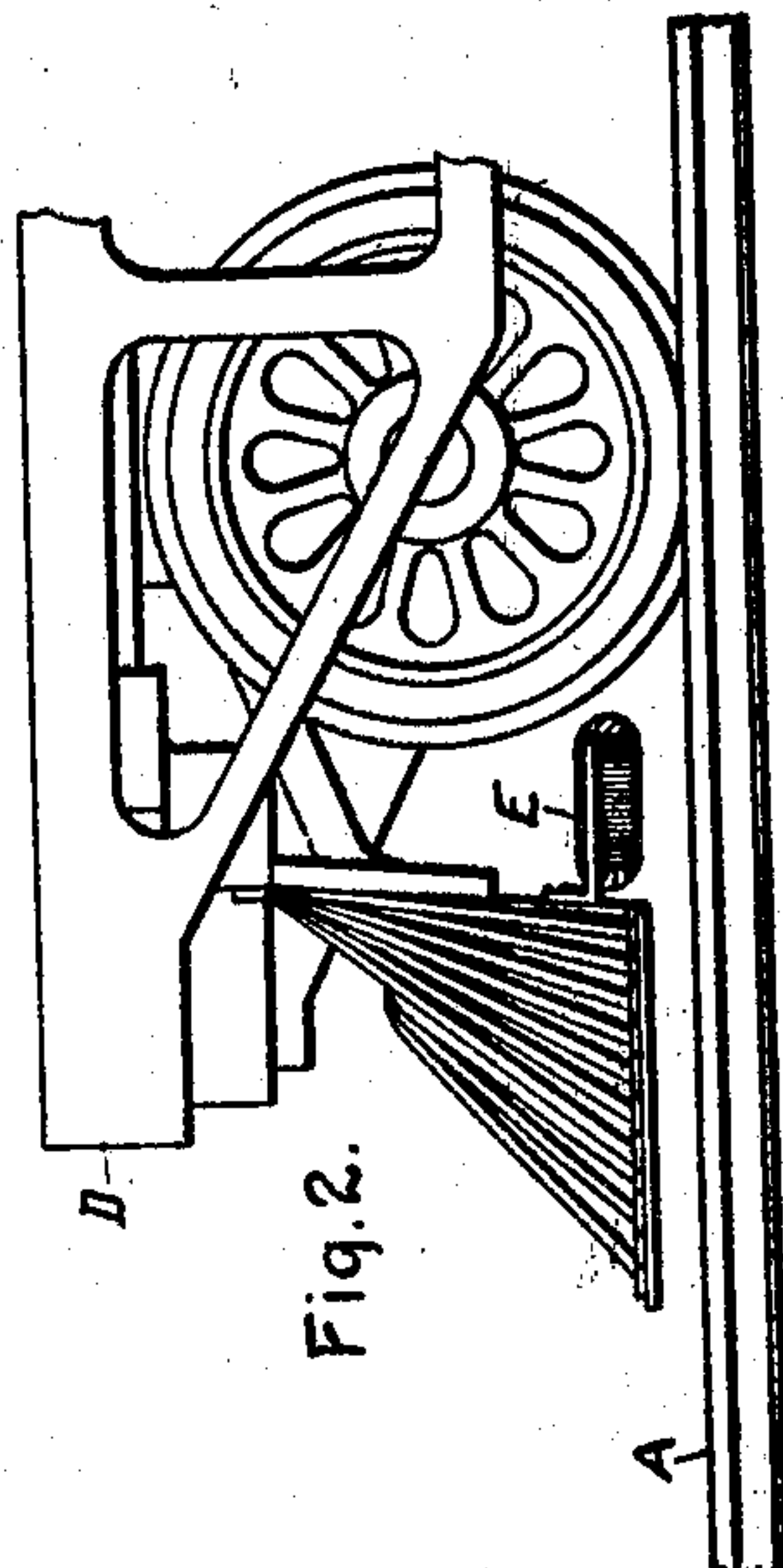


Fig. 2.

WITNESSES:

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ATT'Y.

UNITED STATES PATENT OFFICE.

DAVID P. THOMSON, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CAB SIGNAL SYSTEM.

No. 881,635.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed August 2, 1907. Serial No. 386,749.

To all whom it may concern:

Be it known that I, DAVID P. THOMSON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Cab Signal Systems, of which the following is a specification.

My invention relates to cab signal systems, and is particularly applicable to electric roads operated by direct current, since it does not require the insulating rail joints commonly employed in signal systems, and therefore the rails may be used as return conductor for the power-current, and also since it is not affected by the presence of direct-current in the track.

My invention consists in making both track rails conductively continuous and connecting sources of alternating-current at intervals across the track-rails, and providing the locomotive or other vehicle with a coil carried in front of the front wheels and in inductive relation to the rails and with an electro-responsive indicating device, such as a telephone receiver, connected to the coil. The alternating-current flowing from the sources ahead of the locomotive back through the rails and through the locomotive axles induces a current in the coil which is indicated by the telephone receiver or other indicating device. In such a system, in order that clear, caution and danger indications may be given, I make adjacent sources supply currents of different frequencies, so that the motorman or engineer is enabled to tell whether he is receiving current only from the source immediately ahead of him or from two sources, and consequently knows whether one or two blocks ahead are clear.

My invention will best be understood by reference to the accompanying drawings, in which

Figure 1 shows diagrammatically a cab signal system arranged in accordance with my invention; and Figs. 2 and 3 show a suitable arrangement and construction of the coils on the locomotive.

In the drawings A represents the track-rails, B B¹ represent two alternating-current generators of different frequencies. Transformers C¹, C³ and C⁵ have their primaries supplied from the generator B and their secondaries connected across the track,

while transformers C² and C⁴ have their secondaries similarly connected, but their primaries supplied from generator B¹. The transformers supplied from the two generators alternate so that adjacent transformers supply currents of different frequencies to the track. D represents a car or locomotive moving in the direction of the arrow and carrying coils E E in front of the front wheels. These coils may conveniently be mounted as shown in Fig. 2, between the pilot and front wheels of the locomotive. In this position the coil is protected from mechanical injury by the pilot. The coil is preferably wound on a magnetic core laminated in planes transverse to the rail-length. A telephone receiver F or other indicating device is connected to the coils E E.

With a locomotive in the position shown in Fig. 1, if no other car or train is between the locomotive and the transformer C⁴, current flows from this transformer through the rails and through the locomotive axles, and acting inductively on the coils E E produces in the telephone receiver F a current corresponding in frequency to that of the generator B¹. If no train is between the transformers C³ and C⁴, current also flows from transformer C³ through the rails and locomotive axles, thereby inducing a second current in the coils E E of a frequency corresponding to generator B. Thus, if a train is between the locomotive and the first transformer ahead, the coils E E receive no current at all. If no train is between the locomotive and the first transformer, but if there is a train between the first and second transformers ahead of the locomotive, then the coils E E receive current of a single frequency, while if no train is between the locomotive and the second transformer ahead, then the coils E E receive currents of two frequencies. In this way three different indications may be given; absence of noise in the receiver indicating danger, a note corresponding to one frequency representing caution, and a note corresponding to the two frequencies simultaneously representing clear. By properly selecting the two frequencies, the caution and clear indications may readily be distinguished, since with both frequencies flowing through the track a note is obtained corresponding to the difference in the two frequencies. For instance, if the generators B and B¹ supply current of 250 and 300 cycles, respectively,

then a caution signal will be represented by a note corresponding to either 250 or 300 cycles, while clear will be represented by a note corresponding to 50 cycles. Other frequencies, may, of course, be employed than those mentioned. Of course when the train is close to one transformer there is a tendency for the current supplied by that transformer to increase so that that frequency tends to predominate so greatly as to drown out the effect of the other frequency. This effect, however, may be overcome sufficiently for practical purposes by means of resistances *G* inserted in the secondary circuits of the supply transformers. By properly proportioning these resistances the current when a train is almost directly over the secondary terminals of the transformer may be prevented from increasing too greatly. These resistances further serve to prevent saturation of the transformer core by the power current when the system is applied to an electrically operated road.

While I have illustrated and prefer to use a telephone receiver in combination with different frequencies on the track, since this affords simple and effective means for distinguishing the currents from two different sources ahead of the locomotive, it will be understood that my invention in its broader aspect is not limited to this specific combination, but that other indicating means may be employed with other arrangements for supplying inductively to the indicating means from two points ahead of the train currents which may be distinguished by the indicating means.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In a cab signal system, in combination with a railway having both rails conductively continuous and having sources of alternating-current connected at intervals across the rails, a coil carried by a vehicle in front of the front wheels and in inductive relation to the alternating-current in the rails, and electro-responsive means on the vehicle connected to said coil.

2. In a cab signal system, in combination with a railway having both rails conductively continuous and having sources of alternating-current connected at intervals across the rails, a coil carried by a vehicle in front of the front wheels and in inductive relation to the alternating-current in the rails, and electro-responsive means on the vehicle energized by the current induced in said coil and adapted to produce a signal indication.

3. In a cab signal system, in combination with a railway having both rails conductively continuous and having sources of alternating-current connected at intervals across the rails, a coil carried by a vehicle in front of the front wheels and in inductive

relation to the alternating-current in the rails, and electro-responsive means on the vehicle connected to the coil and adapted to indicate the inductive action on said coil of current from a plurality of said sources ahead of the vehicle.

4. In a cab signal system, in combination with a railway having both rails conductively continuous and having sources of alternating-current connected at intervals across the rails, adjacent sources being of different character, a coil carried by a vehicle in front of the front wheels and in inductive relation to the current in the rails, and electro-responsive means connected to said coil and adapted to indicate the presence in said coil of a plurality of currents of different character.

5. In a cab signal system, in combination with a railway having both rails conductively continuous and having sources of alternating-current connected at intervals across the rails, adjacent sources being of different frequency, a coil carried by a vehicle in front of the front wheels and in inductive relation to the current in the rails, and electro-responsive means connected to the coil and adapted to give different indications for the presence in said coil of two frequencies simultaneously and of one frequency only.

6. In combination with a railway having both rails conductively continuous, cab signal apparatus carried by a vehicle, comprising a coil carried in front of the front wheels and in inductive relation to the rails and electro-responsive indicating means connected to the coil, and means for supplying to the rails at intervals currents adapted to affect said indicating means by inductive action on said coil.

7. In combination with a railway having both rails conductively continuous, cab signal apparatus carried by a vehicle, comprising a coil carried in front of the front wheels and in inductive relation to the rails and electro-responsive indicating means connected to the coil, and means for supplying to the rails at intervals currents adapted to affect said indicating means by inductive action on said coil, the currents supplied from adjacent sources being adapted to produce distinguishable effects on said indicating means.

8. In a cab signal system, in combination with a railway having both rails conductively continuous and having sources of alternating-current connected at intervals across the rails, adjacent sources being of different frequency, a coil carried by a vehicle in front of the front wheels and in inductive relation to the current in the rails, and a telephone receiver connected to the coil.

9. In a cab signal system, in combination

with a railway having both rails conduct-
ively continuous and having sources of
alternating-current connected at intervals
across the rails, a magnetic core carried by
5 the vehicle in front of the front wheels and
adjacent to one of the rails, said core being
laminated in planes transverse to the rail-
length, a coil wound on said core, and electro-
responsive indicating means on the vehicle
10 connected to said coil.

10. In a cab signal system, in combination
with a railway having both rails conduct-
ively continuous and having sources of

alternating-current connected at intervals
across the rails, a magnetic core carried by a 15
vehicle in front of the front wheels and ad-
jacent to one of the rails, said core being
laminated in planes transverse to the rail-
length, a coil wound on said core, and a tele-
phone receiver connected to said coil.

In witness whereof, I have hereunto set my 20
hand this first day of August, 1907.

DAVID P. THOMSON.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.