

June 30, 1936.

W. H. REICHARD

2,045,923

INDUCTIVE DEVICE FOR DETECTING THE PASSAGE OF RAILWAY VEHICLES

Filed Jan. 15, 1935

FIG. 2.

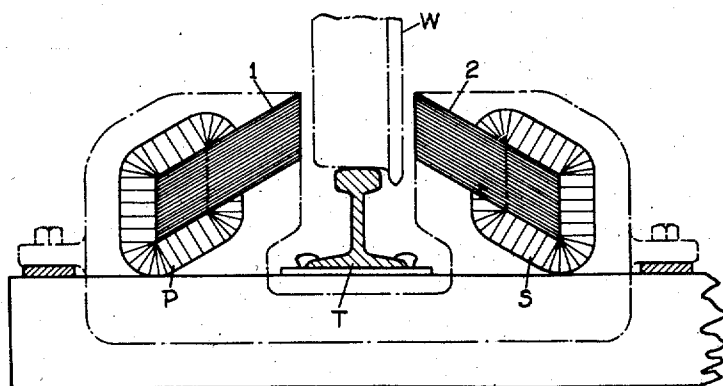
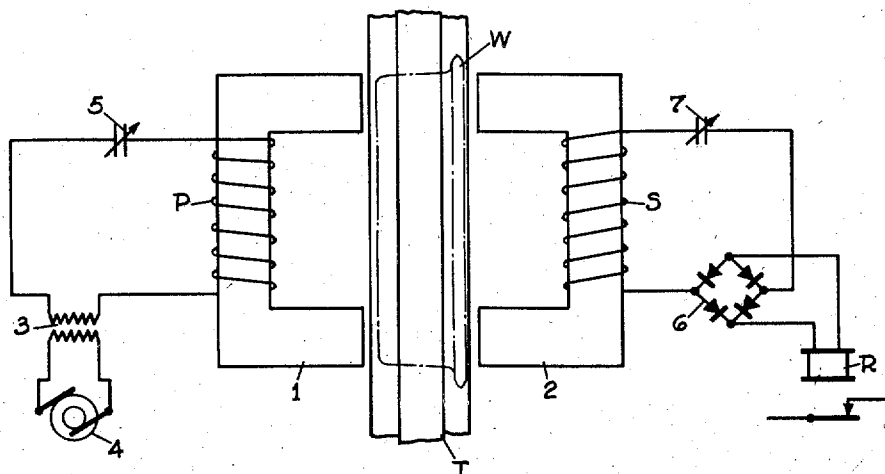


FIG. 1.



INVENTOR
W. H. Reichard,
BY Neil H. Preston,
his ATTORNEY

UNITED STATES PATENT OFFICE

2,045,923

INDUCTIVE DEVICE FOR DETECTING THE
PASSAGE OF RAILWAY VEHICLESWade H. Reichard, Rochester, N. Y., assignor to
General Railway Signal Company, Rochester,
N. Y.

Application January 15, 1935, Serial No. 1,923

6 Claims. (Cl. 246—249)

This invention relates to a device responsive to the passage of railway vehicles, and more particularly to such a device of the inductive type operated by the wheels of the vehicle.

- 5 In the art of railway signalling, in connection with the control of highway crossing signals and with various other types of apparatus and systems, it is sometimes desirable to detect the presence or passage of a railway vehicle or train
10 without employing the well known track circuit operated by a wheel shunt; and in accordance with this invention, generally speaking, it is proposed to provide a device which is inductively responsive to the presence of a wheel of a railway
15 vehicle without physical contact or mechanical impact of engaging parts, said device operating to open or close contacts for any desired control purpose.

- Various characteristic features, attributes, and
20 advantages of the invention will be in part apparent, and in part explained as the description progresses.

- In the accompanying drawing, Fig. 1 is a plan view showing diagrammatically one specific organization of parts in accordance with this invention; and Fig. 2 is an end view illustrating the disposition of the cores with respect to a track rail.

- Generally speaking, the inductive device embodying this invention comprises two coils or windings, conveniently termed primary and secondary coils, which are inductively coupled and preferably mounted on laminated iron cores, the primary coil being energized with alternating
35 current and the secondary coil being connected to a relay or other electro-responsive device, said coils being disposed in such a way with respect to a track rail that the wheel of a vehicle weakens the inductive coupling between said coils and causes de-energization of the relay.

- In the specific form of the invention illustrated, two laminated iron cores 1 and 2 are disposed on opposite sides of the usual track rail T. On one core 1 is the primary coil P, and on the other core 2 the secondary coil S. The upper edges of these cores 1 and 2 are located as far above the upper face of the track rail as clearances will permit, as for example about 2"; and these cores are preferably tilted as shown in
50 Fig. 2 to keep the coils P and S below the upper edges of the cores, the laminations being stepped or staggered to keep the pole faces of these cores substantially vertical. These cores 1 and 2, and
55 the coils P and S, are supported and housed in

a suitable non-magnetic casing fastened to the ties, as indicated by dotted lines in Fig. 2.

The primary coil P is connected to a suitable source of alternating current, preferably of a relatively higher frequency such as 180 cycles. As illustrated, the primary coil P is connected to the secondary of a transformer 3, the primary of which is energized from a suitable source, as the generator 4. The primary circuit also includes a condenser 5, preferably having its capacity adjustable in a suitable manner as by the provision of taps; and this condenser 5 is set with a device in place to make the primary circuit substantially resonant.

The secondary coil S is connected to a suitable electro-responsive device or relay R. As shown, this relay R is assumed to be of the conventional direct current tractive type, and is connected to the circuit of the secondary coil S through a double wave rectifier 6 of the usual and well-known construction. The circuit for the secondary coil S is made resonant by an adjustable condenser 7.

When no car is present, sufficient energy is transferred from the primary P to the secondary coil S through the inductive coupling to energize the relay R.

When a car wheel W passes between the pole faces of the cores 1 and 2, as indicated by dotted lines, the normal magnetic coupling between the primary coil P and secondary coil S is reduced, and the relay R is de-energized. This operation is attributed to the fact that the car wheel being magnetic, tends to shunt the primary flux from the secondary, and also to the fact that, since the wheel is both metallic and magnetic, the inductive reactance and effective resistance in both the primary and secondary circuits are materially changed, thereby detuning both of these circuits to reduce the primary current and thus the voltage induced in the secondary coil, and also decreasing the current in the secondary circuit that would otherwise be produced by the same induced voltage.

Since the ends of the cores 1 and 2 are above the top of the track rail, the presence of the car wheel can materially reduce the transfer of energy from the primary P to the secondary coil S, even though the track rail T is of the usual magnetic material; but if desired, a non-magnetic section of the track rail of manganese steel or the like, may be used at those places where the inductive device of this invention is to be located, so that the car wheel will produce a greater effect.

It will be noted that the relay R is normally energized, and that failure of the source of current, or breaking of wires, will be on the side of safety.

5 In the arrangement shown, the relay R is de-energized when the car wheel comes within the controlling range of the device, and is again energized as soon as the car wheel passes beyond this range; but in certain applications or uses, 10 it may be desirable to make the relay R a stick relay, so that when once de-energized by the passage of the car wheel, it remains de-energized until otherwise restored.

15 While the relay R is shown as a direct current relay of the usual type of construction energized through a rectifier, a device directly operated by alternating current may be employed, preferably a relay of the tractive armature type, such as disclosed in my prior Patent No. 1,785,703, 20 December 16, 1930.

No attempt has been made to disclose any particular application or use of the inductive device of this invention, either for the control of highway crossing signals, for wheel counting 25 purposes or the like, such applications and uses being readily appreciated by one skilled in the art. Also, various adaptations, modifications, and additions may be made in the particular structural organization illustrated, without departing from the principles and functions of the 30 invention.

What I claim is:—

1. A device responsive to the passage of railway vehicles comprising inductively coupled primary 35 and secondary coils disposed in position relative to a track rail to have their coupling reduced by the presence of a vehicle wheel, means for energizing the primary coil with alternating current, and electro-responsive means connected to the 40 secondary coil.

2. A device responsive to the passage of railway vehicles comprising inductively coupled primary and secondary coils disposed in position relative to a track rail to have their coupling reduced by the presence of a vehicle wheel, said 45 primary coil being included in a circuit supplied

with alternating current and tuned to resonance, and electro-responsive means connected to the secondary coil.

3. In a device of the type described, magnetic 5 cores constituting partial magnetic circuits and disposed on opposite sides of the track rail in position to have their polar ends bridged by a vehicle wheel, primary and secondary coils on the respective cores, said primary coil being energized with alternating current, and an electro-responsive 10 device connected to the secondary coil.

4. An inductive device for detecting the presence of a vehicle wheel on a railway track comprising, inductively coupled primary and secondary 15 circuits having portions thereof disposed in position relative to the track rail to have their coupling reduced by the presence of the vehicle wheel, means for energizing the primary circuit with alternating current, said primary and secondary circuits being both resonant at the frequency 20 of said alternating current, and electro-responsive means connected to the secondary circuit.

5. An inductive device for detecting the presence of railway vehicles comprising, magnetic 25 cores disposed on opposite sides of the track rail in position to have their ends bridged by a vehicle wheel, a primary coil on one of said cores included in a resonant circuit supplied with alternating current, a secondary coil on the other core included in a resonant circuit, said secondary circuit including a double-wave rectifier, and a 30 relay connected to said rectifier.

6. An inductive device for detecting the presence of railway vehicles comprising, separate 35 U-shaped magnetic cores disposed on opposite sides of the track rail with their open ends positioned above the rail and in position to have their ends bridged by a vehicle wheel, a primary coil on one of said cores included in a resonant circuit supplied with alternating current, a secondary coil on the other core included in a resonant circuit, and a relay connected to the circuit 40 of the secondary coil.

WADE H. REICHARD. 45