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RAILWAY WHEEL CHECKING DEVICE

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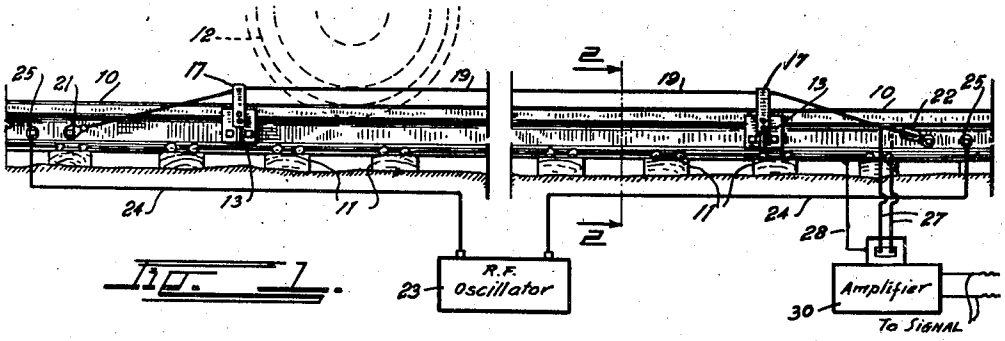


Fig. 1.

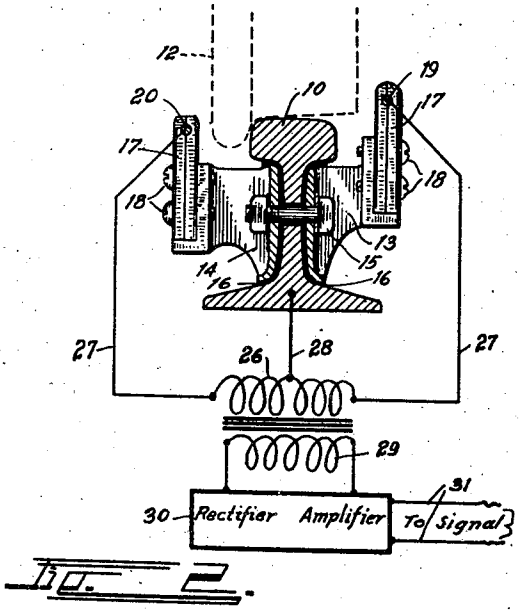


Fig. 2.

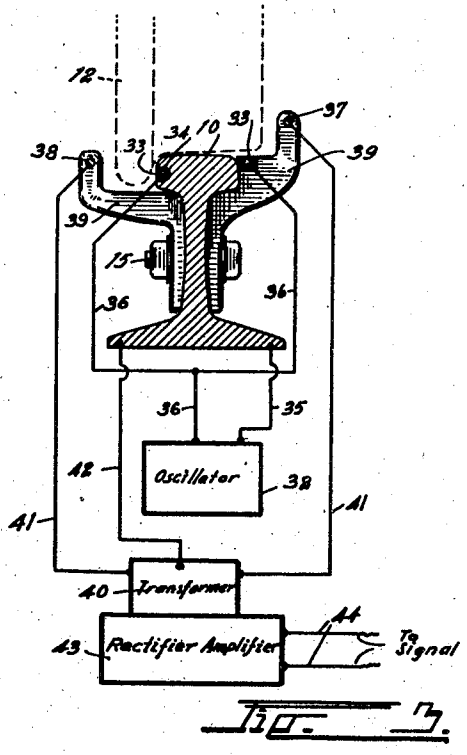


Fig. 7.

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RAILWAY WHEEL CHECKING DEVICE

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5 Claims. (Cl. 246—169)

1

This invention relates to a railway wheel inspection device and has for its principal object the provision of a device of this character which when placed along the rails of a railway track will give a positive indication of broken treads, flanges, etc., on passing wheels regardless of the speed of the train.

Another object of the invention is to so construct the device that there will be no mechanical contacts of any nature with the wheels and no moving or wearing parts.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a fragmentary, side elevation of a typical railroad track, illustrating one form of the invention in place on the rail thereof;

Fig. 2 is an enlarged cross section, taken on the line 2—2, Fig. 1, incorporated in a circuit diagram; and

Fig. 3 is a similar cross section and circuit diagram illustrating an alternate form of the invention.

In all views a typical railway rail is illustrated at 10 with its supporting ties at 11 and the positions of a typical car wheel are indicated in broken line at 12. The complete track, of course, has a similar rail placed parallel to the rail 10. Since both rails of the track are similarly treated in this invention, the latter will be described as applied to the rail 10, it being understood that a similar installation is also applied to the parallel rail of the track.

In applying the first form of the invention to the rail 10, a plurality of brackets 13 are placed along the outside of the rail 10 in spaced-apart relation and a similar plurality of brackets 14 are placed along the inside of the rail 10. Each pair of brackets 13 and 14 are clamped together on opposite sides of the web of the rail by means of suitable clamp bolts 15, there being electrical insulation 16 interposed between the rail 10, the brackets 13 and 14 and the bolts 15 so that the brackets are electrically insulated from the rail. Both the brackets 13 and 14 carry insulated wire clamps 17 attached thereto in any desired manner such as by means of suitable attachment screws 18. The wire clamps 17 of the brackets 13 support a tread pickup wire 19 and the clamps 17 of the brackets 14 support a flange pickup wire 20.

2

The tread pickup wire 19 extends along the rail 10 parallel, and in spaced relation, to the path of the rim of the tread of the wheel 12. The flange pickup wire 20 extends along the rail in parallel relation to the path of the flange of the wheel 12. Both wires 19 and 20 are grounded to the rail at their one extremity, as indicated at 21 and at their other extremities are secured to suitable insulators 22. The length of the wires 19 and 20 is sufficient to exceed the circumference of the largest expected railway wheel.

That section of the rail parallel to the wires 19 and 20 is energized in a longitudinal direction by means of a radio frequency current from any suitable conventional radio frequency oscillator, indicated at 23. The leads from the oscillator, indicated at 24, are connected to the rail 10, as indicated at 25, at points beyond the extremities of the wires 19 and 20. The insulated extremities of the wires 19 are connected to the opposite extremities of a transformer primary coil 26 by means of conductors 27. The mid-point of the coil 26 is grounded to the rail 10 by means of a ground lead 28.

The magnetic lines of force about the rail are, of course, at right angles to its axis and are cut by the wires 19 and 20 causing a current to be induced into them. Since the phase of this current is normally the same in both wires, the two equal currents will cancel each other in a secondary coil 29.

The wires 19 and 20 are so spaced in relation to the rail 10 and in relation to the path of a normal wheel 12 that the same current will be induced in both wires either when no wheel is in position therebetween or when a normal wheel is passing along the rail. The passage of normal treads and flanges will produce the same shielding effect on their respective pickup wires. If, however, either the tread or the flange of a wheel is broken away, the shielding effect will will become unbalanced and more current will flow through one end of the coil 26 than the other end thereof. This differential in current will induce a current in the secondary coil 29. This induced current is fed to a conventional rectifying and amplifying set, indicated by the numeral 30. The output of the latter set is conducted by means of output leads 31, to any desired signaling or recording apparatus capable of recording or indicating the passage of the de-

fective wheel along the rail 10. A similar arrangement will give indications of the passage of defective wheels along the parallel rail of the track.

The wires 19 and 20 may be provided with suitable shielding (not shown) if found necessary to prevent extraneous effects from the passage of brake rods and other low portions of the railway cars.

In Fig. 3, an alternate arrangement of the same invention is illustrated. In this form, radio frequency current from an oscillator 32 is fed by means of a lead 36 into two primary wires 33, one of which is placed immediately below the path of the rim of the tread of the wheel 12 and the other or which is imbedded in suitable insulation in a groove 34 in the flange side of the head of the rail. The other lead from the oscillator 32, indicated at 35, is grounded to the rail. The far extremity of each of the wires 33 is also grounded to the rail.

Therefore, in this form, the wires 33 serve the same purpose as the rail 10 served in the preceding form that is to generate magnetic lines of force thereabout. This form is also provided with an outer tread pickup wire 37 and an inner flange pickup wire 38 supported in brackets of insulating material 39 and positioned similarly to the wires 19 and 20 previously described. The wires 37 and 38 are connected to a balanced transformer 40 by means of conductors 41 as in the preceding form. The mid-point of the primary coil of the transformer is connected to the rail by a lead 42.

The operation and results obtained are similar to the preceding form, a rectifying and amplifying set 43 similar to the previously described set 30 being used to supply current to signal output leads 44.

In all forms illustrated, the circuits at the two sides of one rail have been balanced against each other on the transformer. It is, of course, conceivable that the same effect may be attained by balancing the flange circuit of one rail with either the flange or tread circuit of the opposite rail. In fact any two of the four circuits may be balanced against each other as desired.

In all forms of the invention some form of radiant energy is caused to flow between electrodes or other devices. The paths of flow being intercepted by parts of the rolling wheel. This energy may be electronic, magnetic or beams of light. It is to be understood that the term "radiant energy" refers to any of these forms.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. A detecting device for detecting broken away portions of the tread and flange of a railway wheel comprising: means positioned to project radiant energy across the paths of the tread and flange of said wheel; a first receiving means extending along said rail and receiving the radiant energy being projected across the path of the tread of said wheel; a second receiving means extending along said rail and receiving radiant energy being projected across the path of the flange of said wheel, said two receiving means

being arranged so that the currents induced therein will be balanced in strength normally and during the passage of a complete wheel and adapted to be unbalanced during the passage of an incomplete wheel; and means actuated in consequence of any differential in the strength between the radiant energy received by said two receiving means for giving an indicating signal.

2. A railway wheel defect detecting device comprising: a rail supporting said wheel; means for passing a radio frequency current longitudinally of said rail; a tread pickup wire extending longitudinally of said rail in spaced relation to the path of the tread of said wheel; a flange pickup wire extending longitudinally of said rail on the opposite side thereof in spaced relation to the path of the flange of said wheel, said wires extending parallel to said rail in inductive relation thereto and to a passing wheel tread and a passing wheel flange, respectively; a circuit including each wire, said circuits being balanced so that the induced currents in each are balanced normally and during passage of a complete wheel and are adapted to be unbalanced upon passage of a wheel with a broken tread or flange; and means for translating the difference in the induced currents of the two circuits into signal indications.

3. A railway wheel defect detecting device comprising: a rail supporting said wheel; means for passing a radio frequency current longitudinally of said rail; a tread pickup wire extending longitudinally of said rail in spaced relation to the path of the tread of said wheel; a flange pickup wire extending longitudinally of said rail on the opposite side thereof in spaced relation to the path of the flange of said wheel; a primary winding, one portion of said winding being in a first circuit with the flange pickup wire and said rail, another portion thereof being in a second circuit with the tread pickup wire and said rail, said circuits being arranged so that the currents induced therein will be balanced normally and during passage of a complete wheel and being adapted to be unbalanced upon passage of a wheel with a broken tread or flange; and means for translating current differences between said portions into an indicating signal.

4. A railway wheel defect detecting device comprising: a rail supporting said wheel; means for passing a radio frequency current longitudinally of said rail; a tread pickup wire extending longitudinally of said rail in spaced relation to the path of the tread of said wheel; a flange pickup wire extending longitudinally of said rail on the opposite side thereof in spaced relation to the path of the flange of said wheel; a primary winding, one portion of said winding being in a first circuit with the flange pickup wire and said rail, another portion thereof being in a second circuit with the tread pickup wire and said rail said circuits being arranged so that the currents induced therein will be balanced normally and during passage of a complete wheel and being adapted to be unbalanced upon passage of a wheel with a broken tread or flange, the circuit flow in said two portions being in opposite directions; a secondary winding in inductive relation to said primary winding; and means for translating the current induced in said secondary winding into an indicating signal.

5. A railway wheel defect detecting device comprising: a rail supporting said wheel; means for passing a radio frequency current longitudinally of said rail; a tread pickup wire extending

longitudinally of said rail in spaced relation to the path of the tread of said wheel; a flange pickup wire extending longitudinally of said rail on the opposite side thereof in spaced relation to the path of the flange of said wheel, one extremity of each of said wires being grounded to said rail, the remainders thereof being insulated from said rail, said wires extending parallel to said rail in inductive relation thereto and to a passing wheel tread and a passing wheel flange, respectively; a circuit including each wire, said circuits being balanced so that the induced currents in each are balanced normally and during passage of a complete wheel and are adapted to be unbalanced upon passage of a wheel with a broken tread or flange; a primary transformer winding; means grounding the mid-point of said coil to said rail, each extremity of said coil being connected to the insulated extremity of one of said pickup wires; a secondary transformer winding positioned in inductive relation to said primary winding; amplifying means connected with said secondary winding for amplifying the electric impulses received therefrom; and signal

means operable from said secondary winding for giving a signal indication in consequence of the current received from said amplifying means.

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