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CIRCUIT CONTROLLING INSTRUMENT

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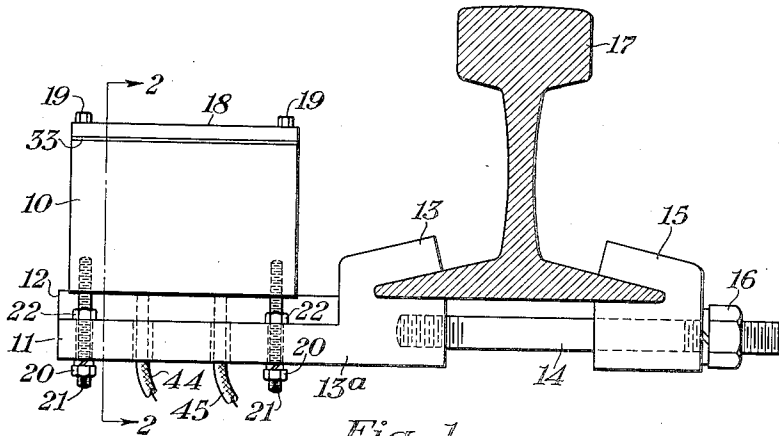


Fig. 1.

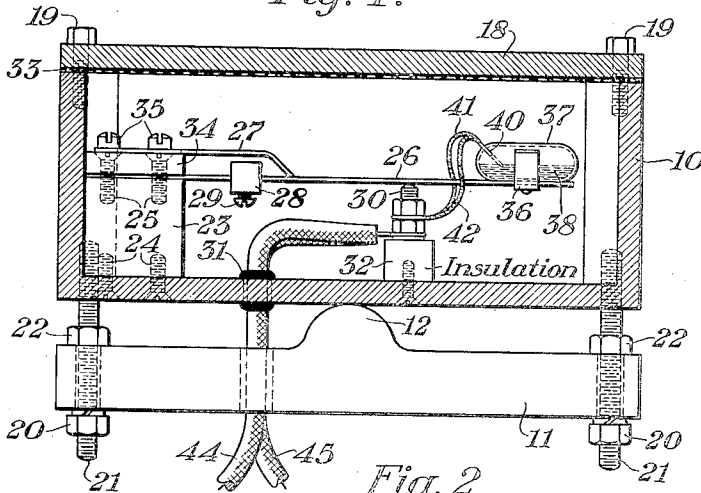


Fig. 2.

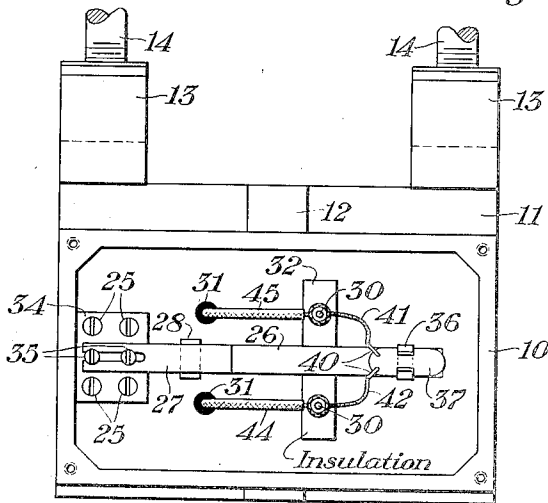


Fig. 3.

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CIRCUIT CONTROLLING INSTRUMENT

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11 Claims. (Cl. 246—251)

My invention relates to circuit controlling instruments of the type in which a vibrative element is employed to modify the condition of an electric circuit, when its equilibrium is disturbed by the deflection of a rail or other object on which it is supported.

While an instrument of the character of my invention may be effectively employed for various purposes, it is more particularly designed for use as a track instrument actuated by the movement imparted to the same by passing trains, for the purpose of visibly or audibly announcing their approach at stations, crossings, or other distant points along the line, through the instrumentality of a signaling appliance controlled by an electric circuit in which the instrument is included.

It is a primary object of my invention to provide a circuit controlling instrument of the type above mentioned, which while sensitive to a degree which compels it to readily respond to any deflection of the track with which it is associated, at the same time has stable characteristics irrespective of the current carried or variations in temperature which may occur under varied operating conditions.

In the drawing, Fig. 1 is a view showing a track rail in transverse section with a track instrument embodying my invention attached thereto. Fig. 2 is a section taken on line 2—2 of Fig. 1, but with certain parts, including the track rail, omitted; While Fig. 3 is a plan view of the track instrument shown in Fig. 1 with the instrument cover removed to show the mechanism within the casing.

Similar reference characters refer to similar parts in each of the several views.

Referring to the drawing, the reference numeral 11 designates a track instrument supporting plate of rectangular shape, having a channel portion formed by parts 13 and 13^a for receiving one side of the base portion of track rail 17. Stud bolts 14 are threaded into part 13^a and carry clamping members 15, only one of which is visible in the drawing, which seize the other side of the base portion of rail 17. It will be apparent that by the application and tightening of nuts 16 to stud bolts 14 the plate 11 is securely anchored in fixed relation to the rail 17.

The reference numeral 10 designates a housing of substantially rectangular section having a removable cover plate 18. The plate is attached to the housing by means of cap screws 19 and its junction with the edge of the housing 10 is rendered impervious to moisture by means

of an interposed gasket 33. The housing 10 is mounted on a rib 12 running across the top of supporting plate 11 and is held in position by four studs 21 threaded into the bottom side of casing 10 at the corners thereof, and passing through appropriate holes in the plate 11. Each of the studs 21 carries adjusting and locking nuts 22 and 20, respectively, on either side of the plate 11, enabling casing 10 to be tilted about rib 12 and then locked in various positions with respect to plate 11 for a purpose which will hereinafter be made clear.

Within the casing 10 there is provided an equipment supporting block 23, held in place by flat-head screws 24 passing through the bottom side of housing 10 and threaded into the block 23. One end of a leaf spring or reed 26 is held clamped between block 23 and a plate 34, which plate is in turn held to block 23 by screws 25. A substantially rigid stop member 27 is adjustably held to plate 34 by screws 35 passing through a slot in the end of member 27 and threaded into plate 34. The free end of member 27 is bent down and normally engages spring 26. This spring carries a weight in the form of a block 28 slidable between block 23 and the bent down end of member 27. A screw 29, threaded into block 28, is used to lock the block in fixed relation to spring 26. The spring 26 also, at its free end, is provided with a clip 36 which holds a glass tube 37 containing a pool of mercury 38 and two contact members 40. Flexible leads 41 and 42 extend from the two contact members 40, respectively, and are secured to terminal posts 30 provided for this purpose. Outside connections with leads 41 and 42 are made by bringing conductors 44 and 45 through holes passing through plate 11 and the base of housing 10, which conductors 44 and 45 are also connected to terminal posts 30. Rubber bushing 31 surround the conductors 44 and 45 at their points of entry into housing 10 to prevent the entry of moisture.

It will be observed that the spring 26 and tube 37 are positioned longitudinally with respect to the rail and are arranged to move in a vertical arc parallel to the rail, which renders the instrument highly sensitive to the vertical movements of the rail, so that only a slight downward deflection of the tube 37 is required to cause the mercury 38 to flow clear of the contact members 40. Since the spring 26, as positioned, is substantially rigid as regards its ability to move sideways, to move the mercury sideways within the tube sufficiently to clear one of the contact members requires an abnormal or intense transverse

movement of the rail. With the tube mounted so that the movement of the mercury within it is not sensitive to transverse movements of the rail, the danger of the mercury being moved clear of one of the contact members 40 consequent to transverse movements of the rail communicated from an adjacent track is reduced to a minimum.

With the member 27 properly adjusted with respect to spring 26, and housing 10 level, the contact members 40 will, when at rest, be immersed in the mercury 38 the desired depth or will be spaced equidistant from the top surface of the mercury, depending whether a normally closed or normally open circuit path is desired. After installation has been made, the rib 12 may not be level so that the contact members 40 may not be similarly positioned with respect to mercury 38. This may, however, be taken care of by simply rotating the tube 37 in its clip 36. By placing a level parallel to rail 17 on the cover plate 18 and by then adjusting nuts 22 and 20 the casing itself may be leveled up so as to assure the normal relation of contacts 40 with respect to mercury 38.

The sensitivity of the instrument to vertical vibrations of the rail may be adjusted as desired by properly setting the weight 28 on spring or reed 26 and also by sliding the stop member 27 so that its bent down portion engages points of reed 26 at varying distances from its fixed end. The stop 27 also limits the upward movement of reed 26 and assists the weight 28 in counteracting excessive motion of the reed when the instrument is subjected to jars of more than ordinary intensity.

During vertical vibration of the rail 17, reed 26 and tube 37 are vibrated through a vertical arc parallel to the rail as is necessary to cause the mercury 38 to move with respect to contact members 40 so that a circuit passing through the mercury and these contact members will be periodically opened and closed.

The use of a mercury type of contact in a track instrument is very desirable, since its resistance, when contact is made, is practically negligible; variations in temperature, or the amount of current which flows through the contact, do not affect its resistance; the circuit is completely broken when the mercury contact opens; and the mercury contact can be used to carry a heavy current. Furthermore, the current flowing through the contact has no effect on the sensitivity of the track instrument.

Although I have herein shown and described only one form of apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination with a railway track rail subject to vibration as a vehicle passes thereover, a resilient reed having one end thereof secured in fixed relation to said rail and having mounted on the free end thereof a closed envelope containing a conductive fluid with contact elements cooperative therewith, and a rigid stop having one end thereof secured in fixed relation to said rail and the other end thereof normally engaging said reed at a point intermediate to its opposite ends for assisting said rail in vibrating said reed and envelope as re-

quired to change the position of said fluid with respect to said contact elements.

2. In combination with a railway track rail subject to vibration, a mounting plate secured in fixed relation to such rail, a rib protruding from the top surface of a portion of said plate and running at right angles to the rail, a casing supported at a central point on said rib; a resilient reed within said casing and having one end in fixed relation to said casing, and therefore set into vibration by vibration of the rail, a weight slidably secured to said reed for regulating its frequency of vibration, a rigid member having one end thereof adjustably secured to said casing and having the other end thereof in engagement with an intermediate point of said reed to further adjust its frequency of vibration; a tube on the free end of said reed containing a pool of conductive fluid and associated contact members, and adjusting means extending between said plate and casing at points on opposite sides of said rib for rotating said casing about said rib to adjust the position of said fluid with respect to said contact members.

3. In a circuit controlling instrument, a supporting member arranged to be clamped in fixed relation to a railway track rail, a rib on said supporting member arranged in a horizontal plane and running at right angles to the railway track rail, a casing supported by said rib, a leaf spring within said casing arranged in substantially a horizontal plane parallel to the track rail and having one end thereof fixed with respect to said casing, a tube carried by the other end of said spring containing contact members and a conductive fluid, and adjustable means extending between said casing and supporting member for holding said casing tilted about said rib as required to bring said conductive fluid in the desired position with respect to said contact members.

4. In a circuit controlling instrument, a supporting member arranged to be clamped in fixed relation to a railway track rail, a rib on said supporting member, a casing resting on said rib, a leaf spring within said casing having one end fixed with respect to said casing, a clamp carried by the other end of said spring; a tube carried by said clamp, containing a conductive fluid having contact members immersed therein and being rotatable within said clamp so that the depth of immersion of the contacts in said fluid may be equalized by rotation of said tube; and adjustable clamping means extending between said casing and said supporting member for rotating said casing about said rib to adjust the normal depth of the immersion of said contact members in said fluid.

5. In a circuit controlling instrument, a supporting member arranged to be clamped in fixed relation to a railway track rail, a rib on said supporting member arranged in a horizontal plane, a casing supported by said rib, a leaf spring within said casing arranged in substantially a horizontal plane at right angles to said rib and having one end thereof fixed with respect to said casing, a tube carried by the other end of said spring containing contact members and a conductive fluid, and adjustable means extending between said casing and supporting member for holding said casing tilted about said rib as required to bring said conductive fluid in the desired position with respect to said contact members.

6. In a circuit controlling instrument, a supporting member arranged to be clamped in fixed

relation to a railway track rail, a rib on said supporting member arranged in a horizontal plane, a casing supported by said rib, a leaf spring within said casing arranged in substantially a horizontal plane at right angles to said rib and having one end thereof fixed with respect to said casing, a tube carried by the other end of said spring containing contact members and a conductive fluid and which may be rotated to bring said contact members in like position with respect to said fluid, and adjustable means extending between said casing and supporting member for holding said casing tilted about said rib as required to bring said conductive fluid in the desired position with respect to said contact members.

7. In a circuit controlling instrument, a supporting member arranged to be clamped in fixed relation to a railway track rail, a rib on said supporting member, a casing resting on said rib, a leaf spring having one end thereof fixed with respect to said casing, a tube carried by the other end of said spring containing contact members, a conductive fluid within said tube in the desired position with respect to said contact members when the top of said casing is level, and adjustable clamping means extending between said casing and said supporting member for rotating said casing about said rib as required to bring the top of said casing in the level position.

8. In a circuit controlling instrument a casing, a suitable support for said casing connected with a railway track rail, a vibratory member within said casing having one end in fixed relation thereto and having on its other end a tube containing a pool of mercury having two contact members constantly immersed therein only while said tube is at rest, and a substantially rigid member having one end thereof fixed to said casing and having its other end in engagement with an intermediate portion of said vibratory member to limit its range of movement in one direction to thereby amplify its frequency of vibration.

9. In a circuit controlling instrument, a vibratory member having one end in fixed relation with a railway track rail and arranged longitudinally with respect to the rail; and a tube on the free end of said member, containing a conductive fluid with two contact members immersed therein, and arranged longitudinally with respect to the track rail so that a slight downward deflection of said tube will cause said fluid to flow clear of at least one of said contact members, whereas a comparatively large and intense sidewise movement of said tube will be required to move said fluid clear of either one of said contact members.

10. In a circuit controlling instrument, a member arranged longitudinally with respect to a railway track rail having one end thereof secured in fixed relation to such rail and arranged to vibrate in a vertical arc; and a tube on the free end of said member, containing a conductive fluid with two contact members immersed therein, and also arranged longitudinally with respect to the rail so that a slight vertical deflection of said tube will cause said fluid to flow clear of at least one of said contact members, whereas an intense sidewise movement of said tube will be required to cause said fluid to move clear of either of said contact members.

11. In a circuit controlling instrument, a tube containing a conductive fluid normally bridging the gap between two contact members within said tube, and a flexible support for said tube secured in fixed relation to a railway track rail and arranged to vibrate in a vertical arc parallel to the rail so that a very slight vertical vibration of the rail will produce a movement of said support and tube sufficient that said fluid will move clear of said contact members, whereas comparatively little movement of said fluid with respect to said contact members will result from a substantial sidewise movement of the rail.

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