Aug. 17, 1943. H. G. WITMER 2,326,989

CIRCUIT CONTROLLING INSTRUMENT

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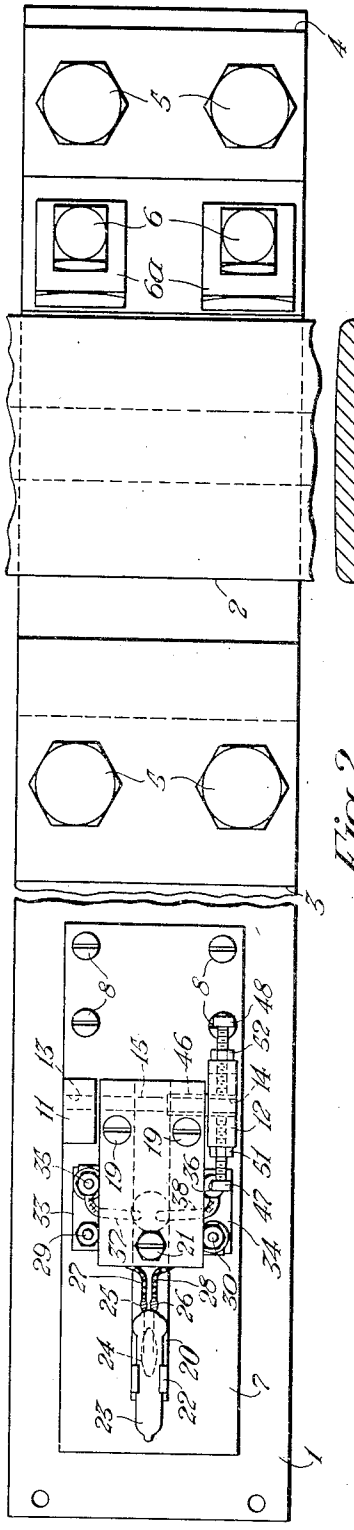


Fig. 2.

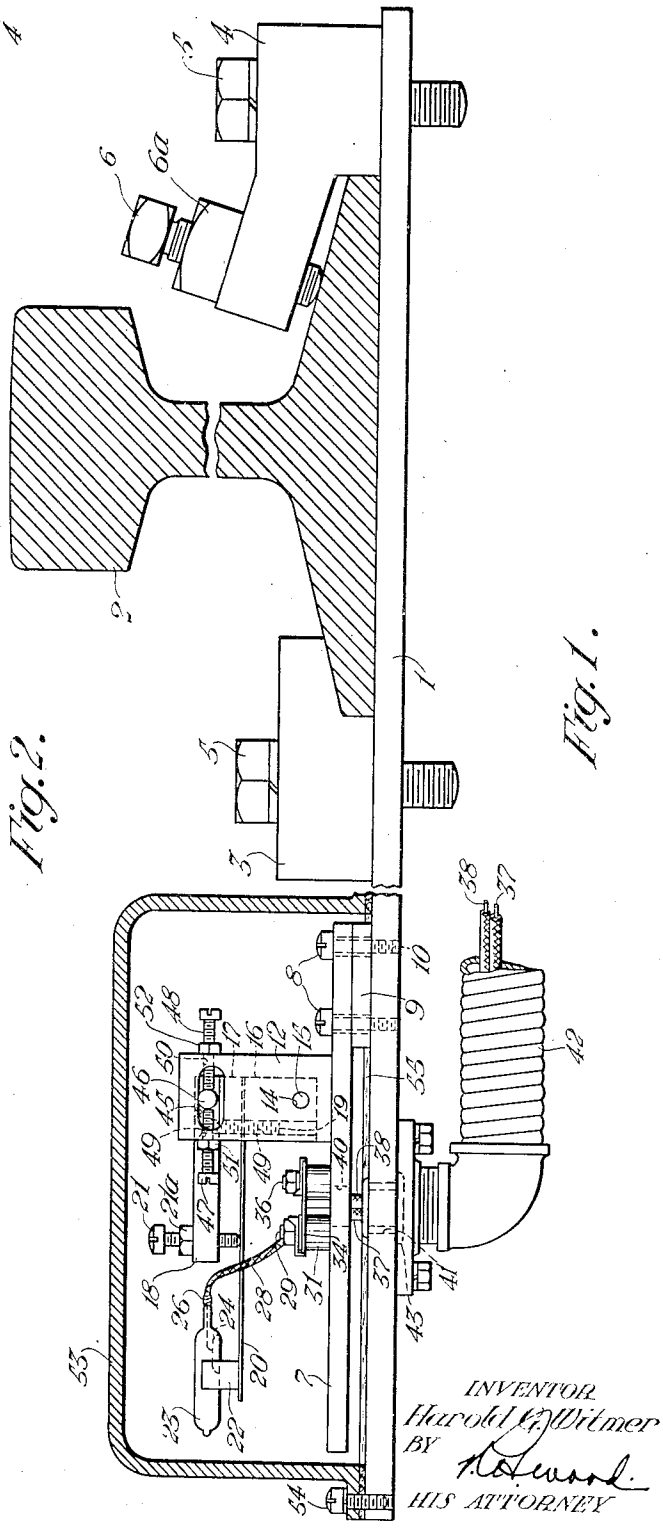


Fig. 1.

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CIRCUIT CONTROLLING INSTRUMENT

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3 Claims. (Cl. 200—52)

My invention relates to circuit controlling instruments, and particularly to circuit controlling instruments which are effective to modify the condition of an electric circuit in response to shock or vibration transmitted to the instrument.

More particularly, my invention relates to circuit controlling instruments which are adapted for mounting on a railway track rail, and which respond to vibrations imparted to the rail by passing trains, for the purpose of visibly or audibly announcing the approach of a train at stations, crossings, or other distant points along the line, through the instrumentality of a signaling device controlled by an electric circuit in which the instrument is included.

One object of my invention is to provide an instrument of the type described employing a mercury contact, and having improved means for holding the contact and also for adjusting the immersion of the electrodes in the mercury of the contact to control the sensitivity of the instrument.

Instruments embodying my present invention are an improvement upon those described in my prior Patent No. 2,076,928, granted on April 13, 1937.

According to my invention, a heavy plate is rigidly fastened at one end to a track rail by means of clamps, and a somewhat thinner plate is rigidly fastened at one end to this heavy plate. A reed assembly consisting of a reed provided at one end with a mercury contact is secured at the end opposite to the contact to a supporting member which is pivotally attached to said second mentioned plate, and which supporting member carries an adjustable stop for the reed. The supporting member for the reed cooperates with adjustable means which permits it to be rocked about its pivot to obtain within limits any desired degree of immersion of the electrodes of the mercury contact. When a train passes over the rail to which the instrument is attached, the two plates and the reed are all set into vibration, but due to their different stiffnesses they vibrate at different frequencies which amplifies the movement of the mercury contact carried by the reed. The movement of the mercury contact momentarily opens any circuit in which it is included.

Other objects and characteristic features of my invention will become apparent as the description proceeds.

I shall describe one form of instrument embodying my invention, and shall then point out the novel features thereof in claims.

In the accompanying drawing, Fig. 1 is a view showing a track rail in transverse section with a track instrument embodying my invention attached thereto, the cover of the instrument being shown in section to better illustrate the remaining parts. Fig. 2 is a top plan view with the cover removed of the instrument shown in Fig. 1.

Similar reference characters refer to similar parts in both views.

Referring to the drawing, the instrument in the form here shown comprises a heavy rectangular supporting plate 1 which is securely fastened at one end to the base of a railway track rail 2 by means of clamps 3 and 4 and studs or bolts 5. The one clamp 3 directly engages the upper side of the base flange, while the other clamp 4 overlies the base flange with some clearance and is threaded for the reception of set screws 6 which are screwed into engagement with the upper side of the base flange, whereby the supporting plate may be readily secured to rails of different weights having base flanges of different thicknesses. The set screws 6 are arranged to be locked in place by means of lock nuts 6a in the usual and well-known manner.

A second plate 7, which is considerably thinner and somewhat narrower than the supporting plate 1, is rigidly fastened at one end to the supporting plate 1 intermediate its ends by means of four screws 8 which extend downwardly through clearance holes in the plate 7 and in a spacing block 9, and are screwed into tapped holes 10 formed in the plate 1.

Secured to the plate 7 at its opposite sides adjacent its rigid end are two vertically extending spaced parallel uprights 11 and 12 provided with aligned holes 13 and 14. These holes receive with some clearance a pivot pin 15 which pivotally supports the lower one of three superposed blocks 16, 17 and 18. These blocks are rigidly fastened together by means of screws 19, and clamped between the lower two blocks 16 and 17 is a reed 20. The upper block 18 projects out over the reed 20 in vertically spaced relation for some distance and is provided adjacent its outer end with an adjustable stop screw 21 which engages the reed intermediate its ends for a purpose which will appear presently. The stop screw is arranged to be locked in an adjusted position by means of a jam nut 21a.

The reed 20 at its free end is provided with a clip 22 which supports a mercury contact. This contact may have any preferred construction, and as here shown comprises a glass envelope 23 containing a pool of mercury 24 and two electrodes 25 and 26 which at times make contact

with the mercury. Flexible leads 27 and 28 extend from the electrodes 25 and 26 and are secured at their lower ends to terminal posts 29 and 30. The terminal posts 29 and 30 are moulded into the upper ends of insulating supports 31 secured at their lower ends to the plate 7, and are connected by means of strap connectors 33 and 34 with other terminal posts 35 and 36. These latter terminal posts are similar to the terminal posts 29 and 30, and are secured to the plate 7 in the same manner as the terminal posts 29 and 30. Attached to the terminal posts 35 and 36 are lead-in wires 37 and 38 which extend through aligned clearance holes 40 and 41 provided in the plates 7 and 1, and through a flexible conduit 42 which is clamped to the undersides of the plate 1. A rubber grommet 43 surrounds the wires 37 and 38 where they pass through the hole 41 to seal this opening against the entry of moisture.

It is desirable to be able to readily control the degree of immersion of the electrodes 25 and 26 in the pool of mercury to assist in controlling the sensitivity of the device to vibration, and for this purpose the one upright 12 is made higher than the other upright and is provided adjacent its upper end with a transverse slot 45 which receives with some clearance the outer end of a laterally projecting pin 46 secured to the block 18. Two screws 47 and 48 mounted in tapped holes 49 and 50 provided in the upright 12 extend into the slot 45 on opposite sides of the pin 46, and cooperate therewith in such manner that by screwing the one screw in and backing the other screw out the assembly comprising the reed and contact and the associated blocks 16, 17 and 18 can be readily rocked as a unit through a limited angular distance about the pivot pin 15. It will be obvious that when this assembly is rocked about the pivot pin, it will change the inclination of the mercury contact and will thus change the degree of immersion of the electrodes 25 and 26 in the pool of mercury 24. The screws may be locked in their adjusted positions by means of jam nuts 51 and 52 mounted on the screws 47 and 48.

The plates 7 and all parts carried thereby are enclosed within a cover 53 held in place by studs 54. A gasket 55 of cork or the like is interposed between the cover and the supporting plate 1 to prevent dirt, moisture or other foreign substances from reaching the enclosed parts.

In operation, when a train or car passes over the rail 2, the heavy plate 1, the lighter plate 7, and the reed 20 are all set into vibration, but due to the fact that they all have different lengths and different degrees of stiffness they all vibrate at different frequencies. The different frequencies of vibration cause beats which amplify the movement of the mercury contact. The parts are so adjusted that when the rail is not vibrating, the electrodes 25 and 26 of the mercury contact will be immersed in the pool of mercury, and when the contact is vibrated, the vibration causes the pool to momentarily move out of engagement with one or both electrodes, thereby opening any circuit in which the contact may be included. The sensitivity of the device depends to some extent upon the stiffness of the reed 20, and the amount of initial tension which is present in the reed. This tension can be varied within limits by means of the adjusting screw 21 as is obvious.

In actual practice an instrument embodying my invention may be used for a variety of purposes. For example, it may be used to control highway crossing signals in the manner shown in Letters Patent of the United States No. 2,091,687 granted to Bernard E. O'Hagan and myself on August 31, 1937, for Apparatus for the control of highway crossing signals, in which event it would be used in place of the instruments M1 and M2 shown in said patent.

One advantage of an instrument embodying my invention is that it can be readily mounted on a rail at any desired location, regardless of whether the track of which the rail forms a part is curved or banked, and that by properly adjusting the parts it can be made to work with equal sensitivity at all locations.

Although I have herein shown and described only one form of instrument 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. A circuit controlling instrument comprising a rigid plate provided at one end with means for clamping it to a railway track rail subjected to vibration as a vehicle passes thereover, a second plate less rigid than said first plate clamped at one end to said first plate intermediate its ends by means which leaves the other end of said second plate free to vibrate, a pair of superposed blocks pivotally attached to said second plate for limited pivotal movement about a horizontal axis, means for clamping said blocks in an adjusted fixed position with respect to said second plate, a reed clamped at one end between said blocks, and a mercury contact secured to the free end of said reed.

2. A circuit controlling instrument comprising a rigid plate provided at one end with means for clamping it to a railway track rail which is at times subjected to vibration by passing vehicles, a second plate rigidly fastened at one end to said first plate intermediate its ends, said second plate being free to vibrate at its free end, a pair of laterally spaced vertical uprights secured in laterally spaced relation to said second plate, the one said upright being provided with a transverse slot, three blocks clamped together in superposed relation and pivotally supported between said uprights by means of a pivot pin passing through the lower block, a laterally projecting pin mounted in the upper block and extending with clearance into said slot, screws screwed through said one upright and projecting at their ends into said slot and cooperating with said laterally projecting pin on opposite sides thereof to enable said blocks to be rotated to and locked in an adjusted position with respect to said second plate, and a reed clamped between two of said blocks and provided at its free end with a mercury contact.

3. A circuit controlling instrument comprising a rigid plate provided at one end with means for clamping it to a railway track rail which is at times subjected to vibration by passing vehicles, a second plate rigidly fastened at one end to said first plate intermediate its ends, said second plate being free to vibrate at its free end, a pair of laterally spaced vertical uprights secured in laterally spaced relation to said second plate, the one said upright being provided with a transverse slot, three blocks clamped together in superposed relation and pivotally supported between said uprights by means of a pivot pin passing through

the lower block, a laterally projecting pin mounted in the upper block and extending with clearance into said slot, screws screwed through said one upright and projecting at their ends into said slot and cooperating with said laterally projecting pin on opposite sides thereof to enable said blocks to be rotated to and locked in an adjusted position with respect to said second plate, a reed clamped at one end between the two lower blocks and provided at its free end with a mercury contact, said upper block extending over and being vertically spaced from said reed, and a third screw adjustably screwed through said upper block and cooperating with said reed intermediate its ends to control its sensitivity to vibration.

HAROLD G. WITMER.