Aug. 20, 1935. A. J. SORENSEN 2,011,658

TRAIN COMMUNICATING APPARATUS FOR RAILWAYS

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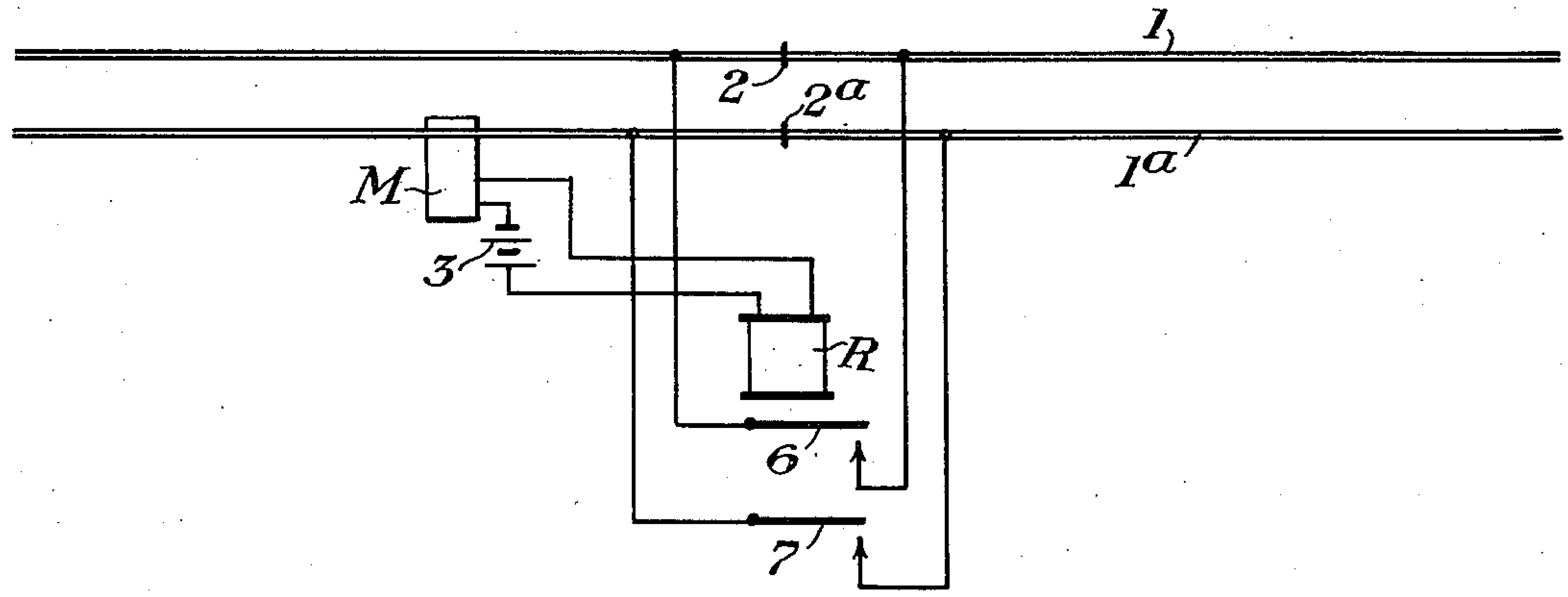

Fig. 1.

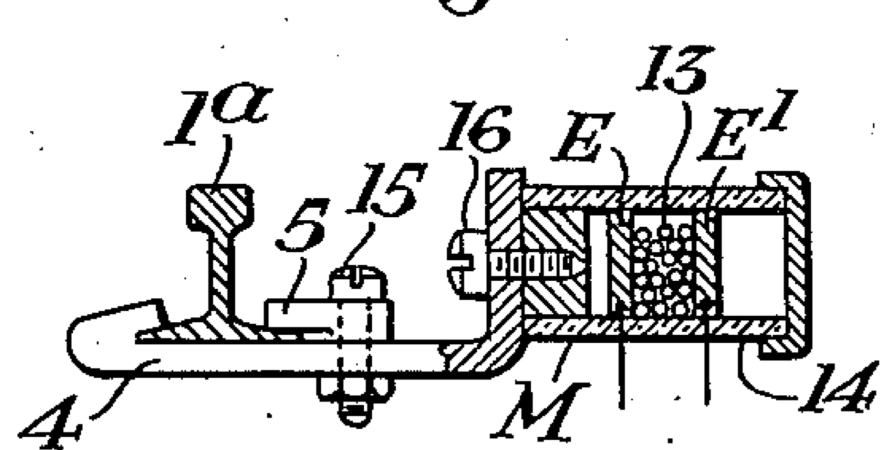

Fig. 2.

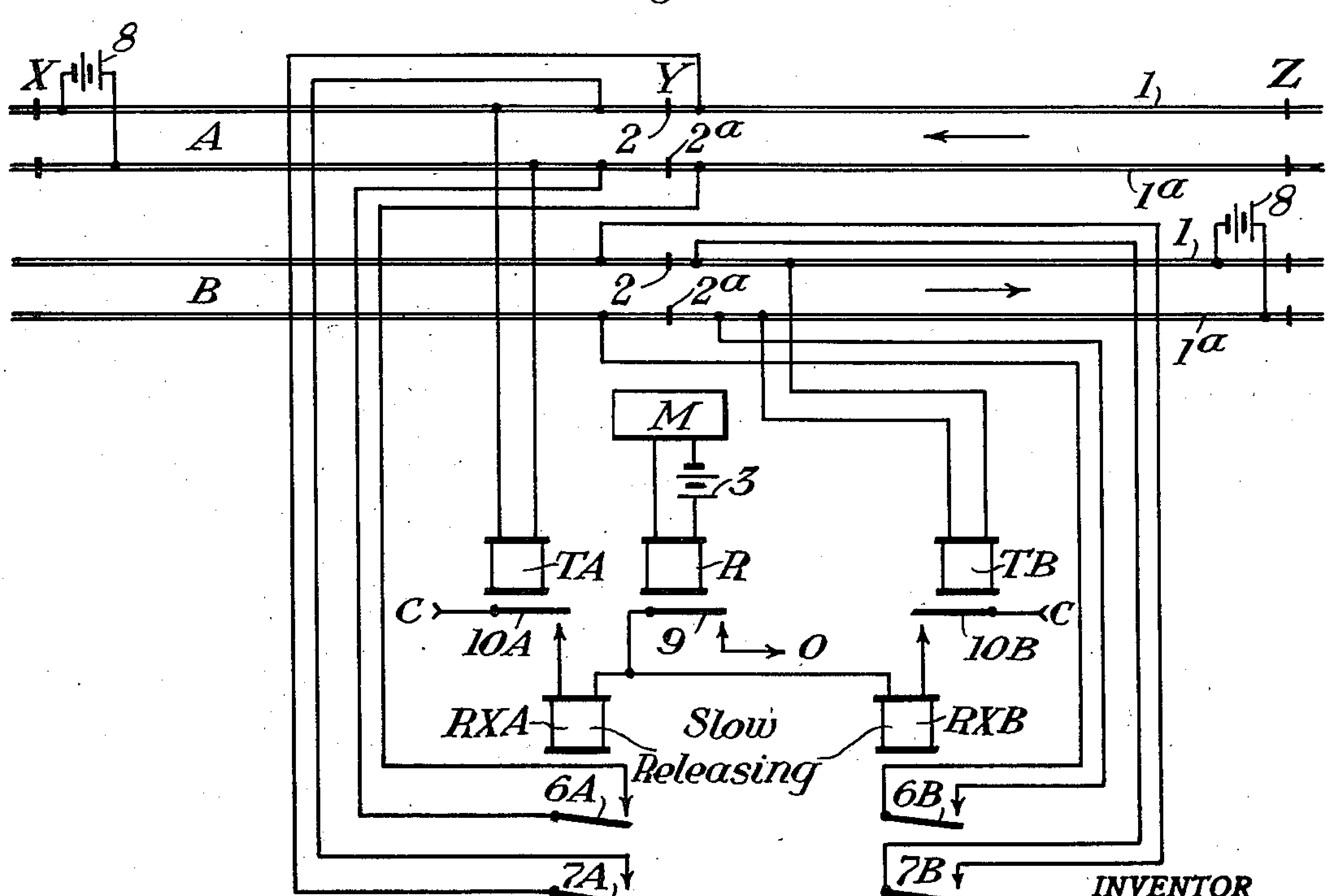

Fig. 3.

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TRAIN COMMUNICATING APPARATUS FOR RAILWAYS

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6 Claims. (Cl. 246—8)

My invention relates to electrical systems for communication between two points on a railway train or between a train and a fixed point, and more particularly it relates to trackway apparatus for use in connection with such systems.

One form of train communicating system with which my invention may be used, is disclosed and claimed in an application for Letters Patent of the United States filed by L. O. Grondahl on May 6, 1930, Serial No. 450,135, for Apparatus for signaling between two points on a railroad train. One object of the present invention is the provision of means for bridging the insulated joints in a track which is equipped with track circuits, thereby improving the conductivity of the rail path for the communicating current.

I will describe two forms of apparatus embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawing, Fig. 1 is a diagrammatic view showing one form of apparatus embodying my invention. Fig. 2 is a vertical sectional view showing one form of microphone which may be used in the apparatus shown in Fig. 1. Fig. 3 is a diagrammatic view showing a modification of the apparatus shown in Fig. 1 and also embodying my invention.

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

Referring first to Fig. 1, the reference characters 1 and 1ª, designate the track rails of a stretch of railway track, which rails are divided by insulated joints 2 and 2ª, respectively, to form track sections in accordance with the usual practice in railway signaling systems of the track circuit type. A normally open electro-conductive path is provided around joint 2, which path includes a back contact 6 of a relay R; and a similar normally open electro-conductive path is provided around the joint 2ª, which path includes back contact 7 of relay R. The relay R is controlled by a microphone M, which is associated with one of the rails 1ª and is arranged to be vibrated as a train passes along the track in the vicinity of the joints 2 and 2ª.

The microphone M is so designed that it has the characteristic of increasing its resistance in response to vibration by a train. This microphone may be of the type disclosed and claimed in Letters Patent of the United States No. 1,834,077, granted to me on December 1, 1931. Referring particularly to Fig. 2, the microphone is attached to the rail 1ª by means of a clamp 4 which is secured to the flange of the rail by a lug 5 and a bolt 15. The microphone comprises an insulating housing 14 attached to the clamp 4 by a screw 16, which housing contains two spaced vertically disposed metal electrodes E and E¹. The space between these electrodes is partly, but not wholly, filled with loose carbon granules 13.

Relay R is provided with a circuit which passes from a battery 3, through the electrode E, the carbon granules 13, the electrode E¹, and the winding of relay R to battery 3.

The operation of the apparatus is as follows: When there is no moving train in the vicinity of the microphone M, enough current will flow through this microphone to energize relay R, thereby holding contacts 6 and 7 open, so that both of the electro-conductive paths around the insulated joints are open. When there is a moving train in the vicinity of the microphone M, however, the vibration of the track rail 1ª, due to the movement of such train, will cause the microphone M to be continuously vibrated, so that the carbon granules 13 are continuously agitated and the resistance of the current path between the electrodes E and E¹ will then be rapidly varied, being at times below its normal value and at other times above this value. The average value of the resistance of this path will, however, be of the order of two or three times the normal value, and this increase in resistance will reduce the current supplied to the relay R below the release value of this relay. Relay R will then be deenergized to close its back contacts 6 and 7, and thereby close the normally open electro-conductive paths around the joints 2 and 2ª, respectively.

It will be clear from the foregoing that as a train proceeds over a stretch of track provided with apparatus embodying my invention, the insulated joints spanned by the train will be automatically placed on short circuit, so that communication between the two ends of the train or between the train and a fixed wayside station may take place as if there were no insulated joints at that point in the track.

Direct attachment of the microphone to a track rail is not essential; it is only necessary that this microphone be so located that it will be vibrated by a train in the vicinity of the joints with which the microphone is associated.

Referring now to Fig. 3, I have here shown two parallel railway tracks A and B, each of which is divided into track circuit sections by insulated joints 2 and 2ª in the two track rails 1 and 1ª, respectively. Traffic on each of these tracks normally moves in the direction indicated by the associated arrow. Section X—Y of track A is provided with a track circuit comprising a battery 8 and a track relay TA, while section Y—Z of track B is provided with a track circuit comprising a battery 8 and a track relay TB. Associated with track A is a normally deenergized slow-releasing relay RXA, a front contact 6A of which is included in a normally open electro-conductive path around joint 2^a in track A, and a second front contact 7A of which is included in a normally open electro-conductive path around joint 2. Associated with track B is a similar relay RXB, the front contacts 6B and 7B of which are included in normally open electro-conductive paths around joints 2^a and 2, respectively.

Located adjacent the point Y is a microphone M, which is arranged to be vibrated by a passing train on either track. This microphone may, for example, be located in the usual relay cabinet which also houses the track relays TA and TB. This microphone may be similar to the one illustrated in Fig. 2, except that the clamp 4 may be omitted and suitable means may be provided for attaching the microphone to a shelf of the cabinet. This microphone controls a relay R in such manner that the relay is normally energized but becomes deenergized when a train on either track passes the cabinet.

Relay RXA is provided with a circuit which passes from terminal C of a suitable source of current, through back contact 10A of track relay TA, the winding of relay RXA, and back contact 9 of relay R to terminal O of the same source of current. Relay RXB is provided with a similar circuit, which includes back contact 10B of relay TB, and back contact 9 of relay R.

The operation of the apparatus shown in Fig. 3, is as follows: Assuming that a passing train occupies track A, relay R will become deenergized as the train approaches point Y, and relay TA will become deenergized as the forward end of the train enters the forward section X—Y. Relay RXA will then be energized to close the two electro-conductive paths around the joints 2 and 2^a, respectively, in track A, but relay RXB for track B will not be affected, because track relay TB will remain energized. If the train is on track B, relay RXB will become energized in response to the deenergization of relays R and TB and will close the electro-conductive paths around joints 2 and 2^a, respectively, in track B, but relay RXA will not be affected, because track relay TA will remain energized. Of course, if two passing trains occupy the two tracks respectively, both relays RXA and RXB will be energized.

If, during the passage of a train, relay R should become momentarily energized due to slow movement of the train or to any other cause, relay RXA (or RXB) will not release because of its slow-releasing characteristic, and so such momentary operation of relay R will not result in the opening of the electro-conductive paths around the joints in the track occupied by the train. When a train is moving very slowly or is standing still the electro-conductive paths around the joints are not necessary, and so it is not important that relay R should release under those conditions.

Although I have herein shown and described only two forms 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, a stretch of railway track divided into track-circuited sections by insulated joints, a normally open electro-conductive path around one of said joints including a front contact of a normally deenergized relay, and means for energizing said relay including the track relay for one of the adjacent sections and a microphone arranged to be vibrated by a passing train.

2. In combination, a stretch of railway track divided into track-circuited sections by insulated joints, a normally open electro-conductive path around one of said joints including a front contact of a normally deenergized relay, a microphone arranged to be vibrated by a train passing along said track and having the characteristic of increasing its resistance in response to such vibration, a normally energized relay controlled by said microphone, and a circuit for said first relay including a back contact of said second relay and a back contact of the track relay for one of the adjacent sections.

3. In combination, two parallel railway tracks each divided into track-circuited sections by insulated joints, two normally open electro-conductive paths one around each of two adjacent joints in the two tracks respectively, a microphone arranged to be vibrated by a train passing along either track, and means for closing each path including said microphone and the track relay for one of the adjacent sections of the associated track.

4. In combination, two parallel railway tracks each divided into track-circuited sections by insulated joints, two normally open electro-conductive paths one around each of two adjacent joints in the two tracks respectively and each including a front contact of an individual normally deenergized relay, a microphone arranged to be vibrated by a train passing along either of said tracks, and means for energizing one of said relays or the other as a train passes along one track or the other including said microphone and the track relay for one of the adjacent sections of the track occupied by the train.

5. In combination, two parallel railway tracks each divided into track-circuited sections by insulated joints, two normally open electro-conductive paths one around each of two adjacent joints in the two tracks respectively, a microphone arranged to be vibrated by a train passing along either track, and means for closing one of said paths or the other as a train passes along the corresponding track including said microphone and the track relay for one of the adjacent sections of the track occupied by the train.

6. In combination, two parallel railway tracks each divided into sections by insulated joints, two normally open electro-conductive paths one around each of two adjacent joints in the two tracks respectively, a microphone arranged to be vibrated by a train passing along either track, and means responsive to a passing train and including said microphone for closing the path around the joint in the track occupied by the train but not the path around the joint in the other track.

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