Sept. 25, 1951 F. P. MILLER 2,569,111

HIGHWAY CROSSING SIGNALING DEVICE

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Fig. 1.

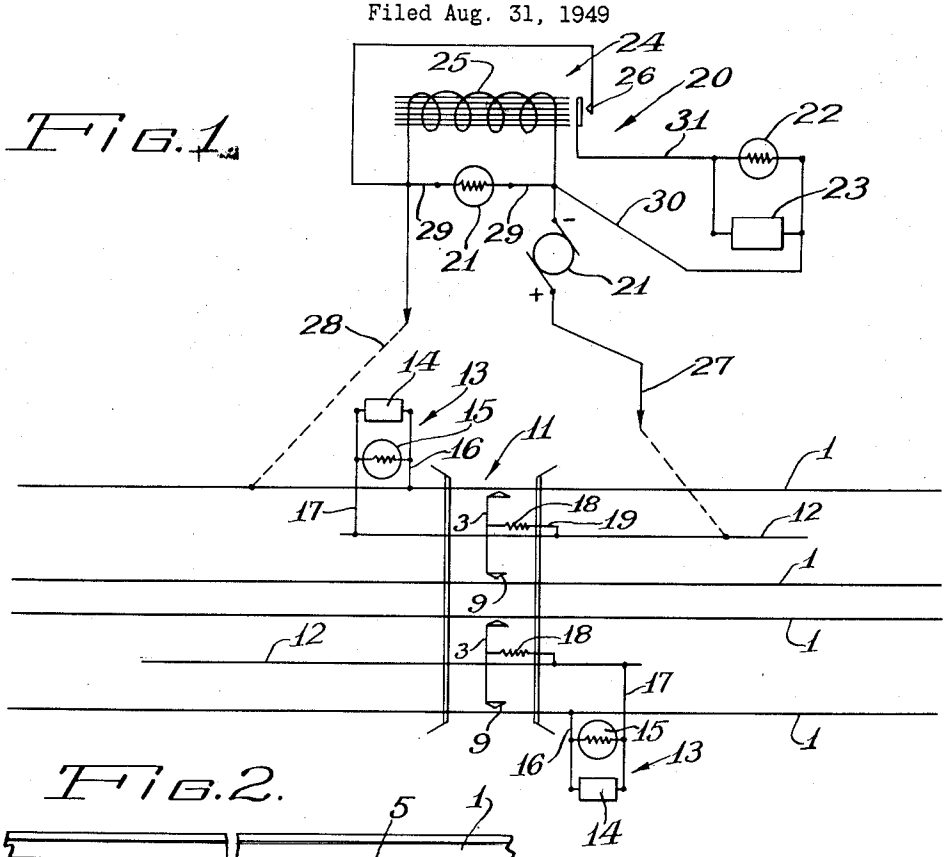


Fig. 2.

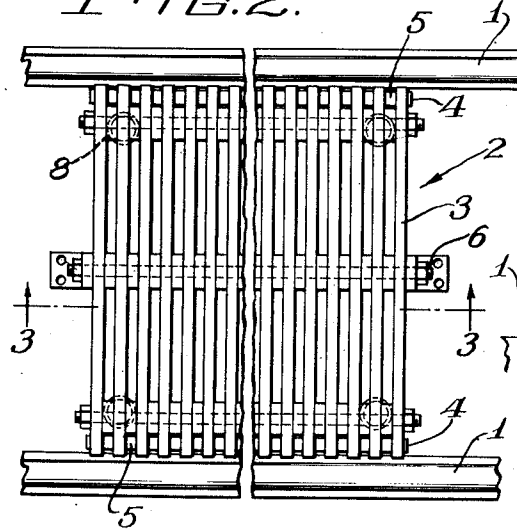


Fig. 4.

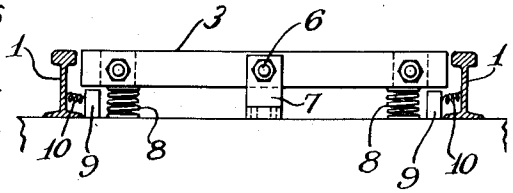
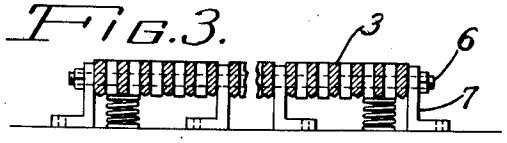


Fig. 3.



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HIGHWAY CROSSING SIGNALING DEVICE

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7 Claims. (Cl. 246—126)

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This invention relates to improvements in signaling devices for railroad crossings and refers particularly to a signaling device for warning the operator of an approaching train that a motor vehicle or the like is stationary on the right-of-way at the crossing.

One of the important features of the present invention resides in its simplicity in operation and its economy of installation, necessitating only a minimum of auxiliary equipment over and above that already existing at automatically guarded crossings.

A further important feature of the invention resides in a signaling device, the source of power for which may be obtained locally as a part of the crossing installation or may be carried by the train.

Another important feature of the invention resides in a signaling device in which the elements for actuating the system are few and can be so constructed and installed so as to function reliably substantially independently of adverse weather conditions.

In the drawings,

Fig. 1 is a diagrammatic view illustrating the wiring system for my improved crossing signal.

Fig. 2 is a top plan view of the crossing.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is an end elevational view illustrating the rockable mounting of the crossing grating.

Referring in detail to the drawing, with specific reference to Figs. 2, 3 and 4, 1—1 indicates a pair of railroad rails. Between the rails 1—1 where a highway may pass over the right-of-way a grating 2 is positioned. The grating 2 may comprise a plurality of bars 3 which are conveniently constructed of metal and may be disposed edgewise in spaced relationship to each other. The bars 3 may be secured together at their ends by tie rods 4 and said bars may be spaced from each other by means of spacers 5.

A pivot rod 6 is positioned through the central portion of the grating 2, said rod passing through all of the bars 3 constituting the grating. The rod 6 is journalled in spaced supports 7 which may be mounted intermediate the rails 1—1. The arrangement is such that the grating, as a whole, is pivotally supported upon rod 6 whereby a vehicle moving onto the grating will rock the grating about the pivot rod 6. Coil springs 8 support the opposite ends of the grating and normally position the grating in a horizontal plane. A contact bar 9 is disposed parallel to each rail 1 and is positioned beneath the ends of the bars 3

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constituting the grating. An electrical conductor 10 connects each contact bar 9 to its adjacent rail 1.

When a vehicle moves over the grating 2 the grating will be rocked about the pivot rod 6 and one end or the other of the bars 3, depending upon in which direction the vehicle passes or upon which side of the pivot rod 6 the greater portion of the vehicle's weight is positioned, will be depressed whereby bars 3 will be brought into contact with one or the other contact bars 9. Under normal circumstances when no vehicle is positioned upon the grating the springs 8 serve to maintain the grating in a horizontal plane with both ends of the grating spaced from the contact bars 9. For purposes of illustration, coil springs are shown as the means for maintaining the grating in its balanced or neutral position. It is to be understood, of course, that leaf springs may be employed if so desired for accomplishing the same purpose.

Referring particularly to Fig. 1 my signaling system is illustrated as being applied to a pair of tracks. Of course, it is to be understood, that as many tracks as desired may be guarded in the fashion to be hereinafter more fully described.

In Fig. 1 the crossing is designated generally by the reference numeral 11, the highway crossing the tracks 1 at substantially right angles. As auxiliary equipment in carrying out my invention, a third rail 12 is positioned between each set of rails comprising a track. The third rail 12 may comprise a metallic rail of relatively light gauge and may extend an appropriate distance down the track from the crossing sufficient to permit the operator of an oncoming train to manipulate his brakes and stop the train before it reaches the crossing. The specific distance that the third rails 12 will extend from the crossing, of course, will depend upon the nature of the traffic of the railroad, that is, if high speed passenger trains move on the tracks the third rail 12 will extend a greater distance than if the tracks are employed only for slow moving freight. Of course, the third rail extends away from the crossing in a direction toward the oncoming train. If, however, traffic upon the tracks moves in both directions on the same set of tracks the third rail will extend an equal distance beyond each side of the crossing.

Signaling devices 13 comprising a bell 14 and light 15 are positioned upon each side of the crossing both devices 14 and 15 being connected in parallel across one of the tracks 1 and the

third rail 12 by means of conductors 16 and 17 respectively. Of course, if desired electrically operated crossing gates (not shown) may also be connected in parallel with the signaling devices 14 and 15 and may be simultaneously operated with said signaling device in the manner to be hereinafter more fully described. A resistance 18 is interposed in conductor 19 which connects the bars 3 to the third rail 12.

A control system 20 is employed in conjunction with my signaling device and is carried by the locomotive which operates upon the tracks 1. The control system comprises a source of electrical energy which for purposes of illustration comprises a generator 21. If desired, the generator 21 may be replaced by any other source of electrical power such as storage batteries or the like.

The control system 20 comprises a signal light 21' which may conveniently be of amber color, a red light 22 and a bell 23. In addition the arrangement 20 may include a relay switch 24. The relay switch 24 comprises a relay coil 25 and armature 26.

One side of the source of power 21 may be connected to the third rail 12 as shown diagrammatically in Fig. 1 by the conductor 27. If the generator or other source of power 21 is carried by the locomotive this connection may comprise a shoe carried by the locomotive which may make contact with the third rail 12 when the locomotive approaches the crossing. The opposite side of the source of power is connected through the relay coil 25 to either or both of the rails 1 by means of conductor 28 shown diagrammatically in Fig. 1. The amber light 21' is connected across the relay coil 25 by means of conductors 29. The red light 22 and bell 23 are connected in parallel with each other and are connected across the source of power 21 by means of conductors 30 and 31. Interposed in conductor 31 is the relay switch 24 which is actuated in a manner to be hereinafter more fully described.

The operation of my device is as follows: With a train approaching the crossing 11 and with no vehicle positioned upon the grating 2 the signaling device 13 at the crossing will be actuated. As the train approaches the crossing the generator 21 which may be carried by the locomotive is in constant operation and the shoe carried by the locomotive makes contact with the third rail 12 thus providing the electrical path diagrammatically designated as 27. The wheels of the locomotive, of course, are in contact with the rail 1 and the said wheels are grounded to the opposite side of the generator 21 thus completing the electrical connection diagrammatically designated as 28. When the connections 27 and 28 are thus made current will pass from the generator 21 through the connection 27 to the third rail 12. Current will therefore pass through the signaling devices 14 and 15 located at the crossing and said current will be returned to the generator through the connection 28 and the amber light 21' which is positioned in the locomotive cab. The fact that the amber light is illuminated will indicate to the operator that a crossing is being approached and that the signaling devices at the crossing are in operation. The relay coil 25 is connected across the amber light 21' and consequently a predetermined current will pass through said relay coil. However, the current drawn by the signaling devices 14 and 15 at the crossing is insufficient to actuate the relay switch 24 which is normally open and consequently the signaling devices 22 and 23 will not be connected in the generator circuit.

If, however, a vehicle is stalled upon the grating 2 and the train approaches the crossing 11, the grating will be so rocked as to connect bars 3 and rails 1 through the resistance 18. Current will then not only pass through the signaling devices 14 and 15 and amber light 21' in the manner hereinbefore described but current will also pass from the third rail 12 directly to the rails 1 through the resistance 18. It can readily be seen, therefore, that the current drawn by the apparatus at the crossing is increased and therefore the current passed through the relay coil 25 increases. With the increased current passing through the relay coil 25 the relay switch 24 is closed thereby connecting the red light 22 and bell 23 in the operator's cab in circuit with the generator 21 thereby warning the operator that a vehicle is stalled upon the crossing 11 and permitting the operator to take the necessary steps in applying brakes etc.

It can readily be seen that the relay switch is of such character that it will be actuated by a predetermined minimum current and when said minimum is exceeded the switch closes. In addition, the resistance 18 is of such value that the signaling devices 14 and 15 will not be shorted out of circuit but will still be operative even though the additional contacts are made by reason of the stalled vehicle upon the grating.

One of the features of my invention resides in the fact that a single circuit is employed to perform the two operations hereinbefore described, that is, to actuate the signaling devices at the crossing in a normal manner and to additionally furnish a signal to the operator of the locomotive when a vehicle is stalled upon the crossing. Consequently, only one additional rail is necessary for each set of tracks and in view of the fact that the total current carried is compartively small and also that relatively low voltages may be employed, the necessity for heavy contact equipment and heavily insulated devices is avoided. The additional contact members at the crossing comprising the bars 3 and contact rails 9 can be of extremely rugged construction and can be adequately protected from the elements.

It is appreciated that modifications of my invention may be made without departing from the spirit and basic concept thereof and consequently I do not wish to be limited except as necessitated by the prior art.

I claim as my invention:

1. In a railroad highway crossing signaling device adapted for use with a track and a railroad vehicle carried by said tracks, a source of electric current carried by said railroad vehicle, a third rail carried parallel to said track adjacent a highway crossing, an external circuit comprising an electric signal positioned adjacent said crossing and connected across a rail of said track and said third rail, means upon said railroad vehicle for connecting said source of current to said external circuit to actuate said signal when said railroad vehicle approaches said crossing, electric signal means carried by said railroad vehicle, switch means for connecting said signal means to said source of current to actuate said signal means, crossing switch means actuated by a highway vehicle at said crossing for increasing the current through said external circuit, and means carried by said railroad vehicle for closing said switch means in responsse to said increase in current in said external circuit.

2. In a railroad highway crossing signalling device adapted for use with a track and a railroad vehicle carried by said track, a source of electric current carried by said railroad vehicle, a third rail carried parallel to said track adjacent a highway crossing, an external circuit comprising an electric signal positioned adjacent said crossing and connected across a rail of said track and said third rail, means upon said railroad vehicle for connecting said source of current to said external circuit to actuate said signal when said railroad vehicle approaches said crossing, electric signal means carried by said railroad vehicle, switch means for connecting said signal means across said source of current, crossing switch means actuated by a highway vehicle at said crossing for increasing the current through said external circuit, and means carried by said railroad vehicle for closing said switch means in response to said increase in current in said external circuit, said crossing switch means comprising a depressible switch closed by the weight of a highway vehicle, and a circuit including said depressible switch between a track rail and said third rail.

3. In a railroad highway crossing signaling device adapted for use with a track and a railroad vehicle carried by said track, a source of electric current carried by said railroad vehicle, a third rail carried parallel to said track adjacent a highway crossing, an external circuit comprising an electric signal positioned adjacent said crossing and connected across a rail of said track and said third rail, means upon said railroad vehicle for connecting said source of current to said external circuit to actuate said signal when said railroad vehicle approaches said crossing, electric signal means carried by said railroad vehicle, switch means for connecting said signal means across said source of current, crossing switch means actuated by a highway vehicle at said crossing for increasing the current through said external circuit, and means carried by said railroad vehicle for closing said switch means in response to said increase in current in said external circuit, said crossing switch means comprising a depressible switch closed by the weight of a highway vehicle, and a circuit including said depressible switch between a track rail and said third rail, and a resistance connected in said last mentioned circuit of predetermined ohmic value to permit a predetermined actuating current to pass through said electric crossing signal and electric signal means carried by said railroad vehicle.

4. In a railroad highway crossing signaling device adapted for use with a track and a railroad vehicle carried upon said track which comprises, a source of electric current carried by said vehicle, an electric conductor disposed parallel to said track adjacent a highway crossing, an electric signal positioned at said crossing and connected to said track and conductor, means upon said vehicle for connecting said source of current across a rail of said track and said parallel conductor when the railroad vehicle approaches said crossing to actuate said crossing signal, electric signal means on said railroad vehicle connectable in series with said source of current and the circuit comprising said rail and parallel conductor, an electric relay switch having a relay coil carried by said vehicle, said relay coil being connected in parallel with said signal means and relay switch, a resistance connectable between said rail and parallel conductor, and depressible means at said crossing for connecting said resistance across said rail and parallel conductor to increase the current through said relay coil and close said relay switch when a highway vehicle rests upon said depressible means.

5. In a railroad highway crossing signaling device adapted for use with a track and a railroad vehicle carried upon said track which comprises, a source of electric current carried by said vehicle, an electric conductor disposed parallel to said track adjacent a highway crossing, an electric signal positioned at said crossing and connected to said track and conductor, means upon said vehicle for connecting said source of current across a rail of said track and said parallel conductor when the railroad vehicle approaches said crossing to actuate said crossing signal, electric signal means carried by said railroad vehicle, switch means for connecting said signal means and said source of current, means connected in series with said source of current and said rail and parallel conductor for actuating said switch means when the current drawn by said rail and parallel conductor circuit increases above a predetermined minimum, a resistance connectable between said rail and parallel conductor, and depressible means at said crossing for connecting said resistance across said rail and parallel conductor to increase the current through said switch-actuating means above said predetermined minimum when a highway vehicle rests upon said depressible means.

6. In a railroad highway crossing signaling device adapted for use with a track and a railroad vehicle carried upon said track which comprises, a source of electric current carried by said vehicle, an electric conductor disposed parallel to said track adjacent a highway crossing, an electric signal positioned at said crossing and connected to said track and conductor, means upon said vehicle for connecting said source of current across a rail of said track and said parallel conductor when the railroad vehicle approaches said crossing to actuate said crossing signal, means carried by said railroad vehicle and connected in the circuit of said source of current for indicating that the crossing signal is actuated, electric signal means on said railroad vehicle connectable in series with said source of current and the circuit comprising said rail and parallel conductor, an electric relay switch having a relay coil carried by said vehicle, said relay coil being connected in parallel with said signal means and relay switch, a resistance connectable between said rail and parallel conductor, and depressible means at said crossing for connecting said resistance across said rail and parallel conductor to increase the current through said relay coil and close said relay switch when a highway vehicle rests upon said depressible means.

7. In a railroad highway crossing signaling device adapted for use with a track and a railroad vehicle carried upon said track which comprises, a source of electric current, an electric conductor disposed parallel to said track adjacent a highway crossing, an electric signal positioned at said crossing and connected to said track and conductor, means upon said vehicle for connecting said source of current across a rail of said track and said parallel conductor when the railroad vehicle approaches said crossing to actuate said crossing signal, electric signal means on said railroad vehicle connectable in series with said source of current and said rail and parallel conductor,

an electric relay switch having a relay coil carried by said vehicle, said relay coil being connected in parallel with said signal means and relay switch, a resistance connectable between said rail and parallel conductor, and depressible means at said crossing for connecting said resistance across said rail and parallel conductor to increase the current through said relay coil and close said relay switch when a highway vehicle rests upon said depressible means.

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