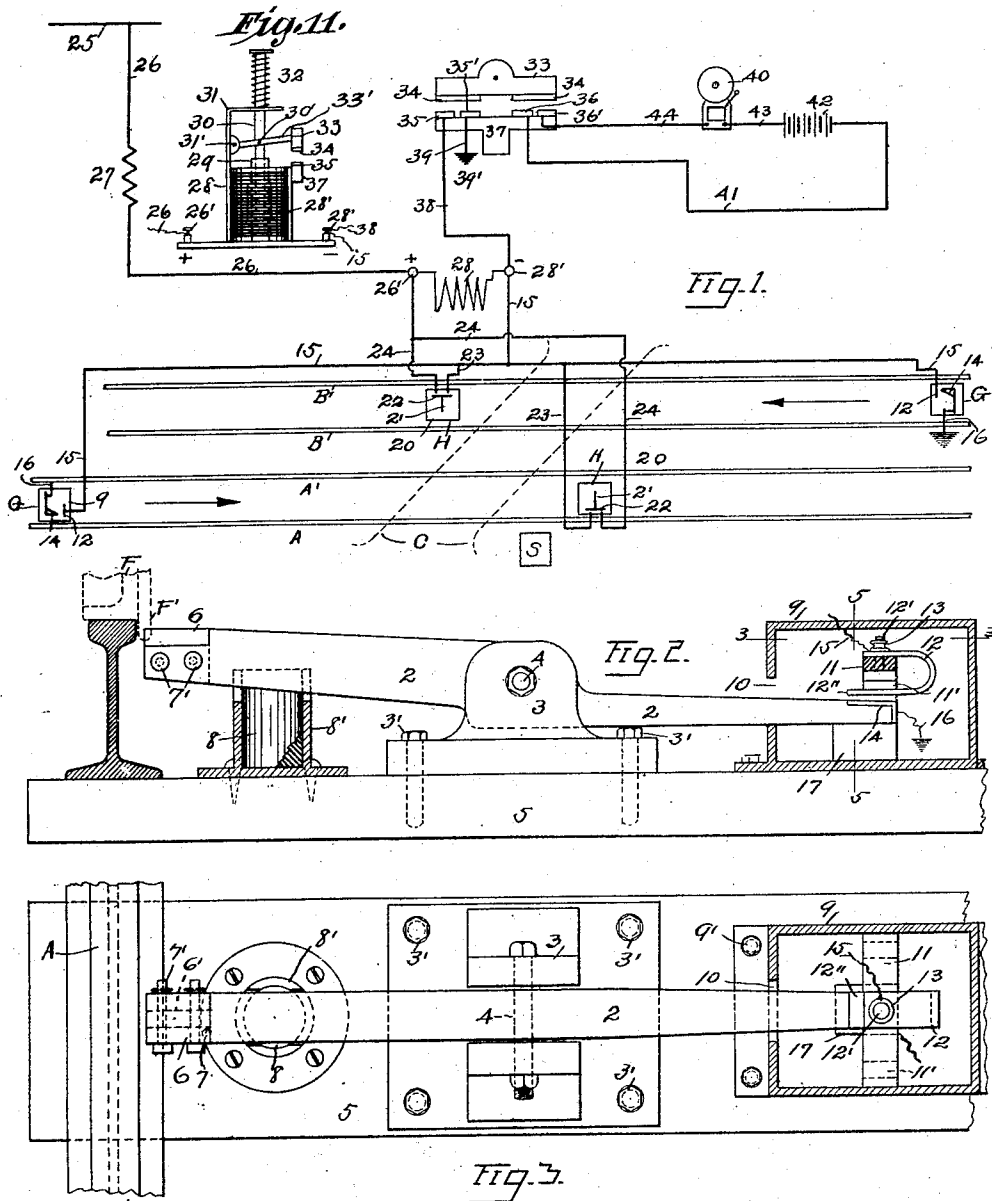


R. C. WARRING.
ELECTRIC SIGNAL SYSTEM.
APPLICATION FILED AUG. 11, 1916.

1,296,346.

Patented Mar. 4, 1919.
2 SHEETS—SHEET 1.



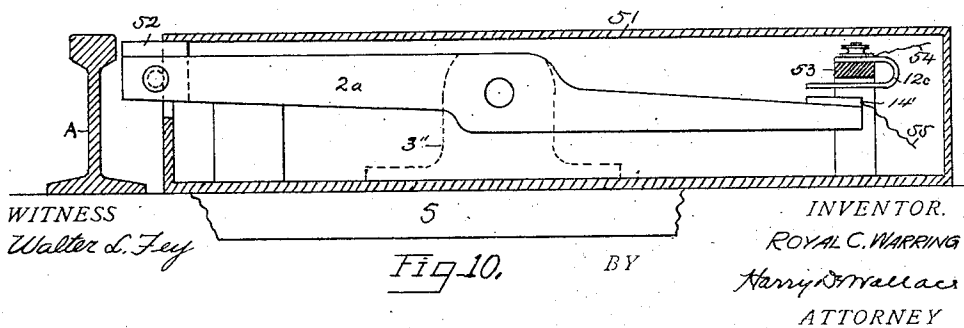
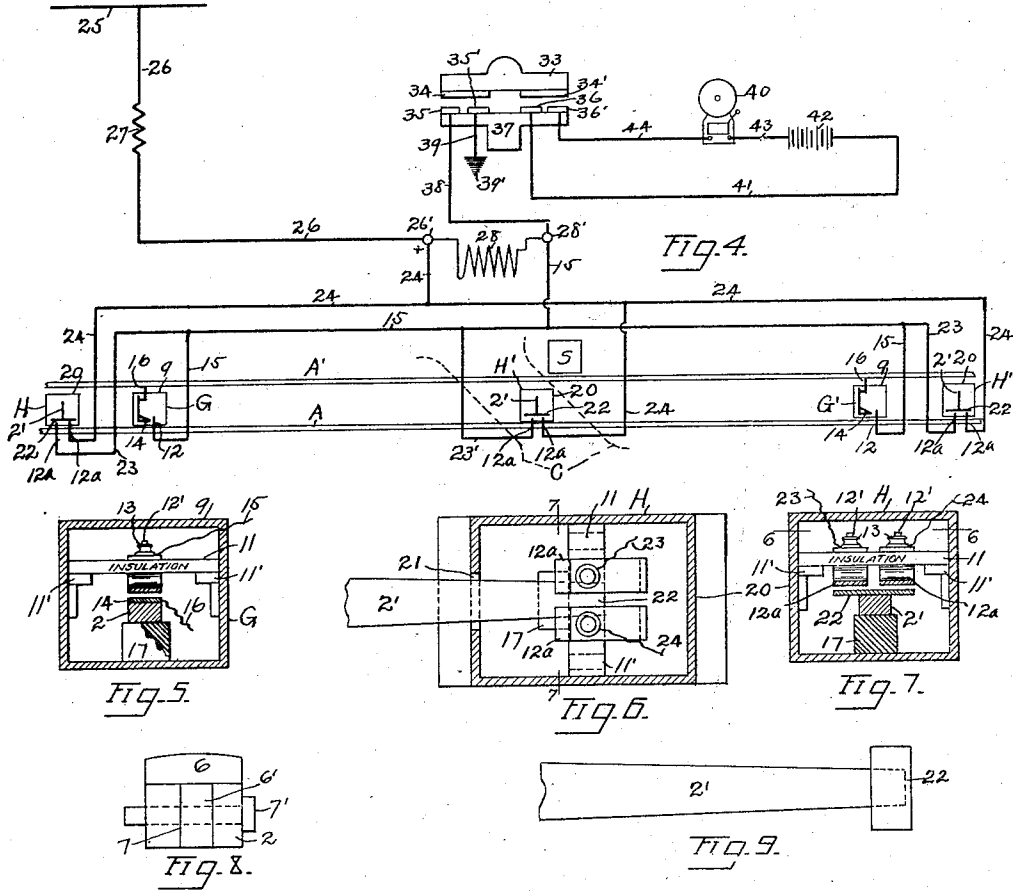
WITNESS
Walter L. Fay

INVENTOR.
ROYAL C. WARRING
BY *Harry D. Wallace*
ATTORNEY

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Fig. 10.

BY

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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNAL SYSTEM.

1,296,346.

Specification of Letters Patent.

Patented Mar. 4, 1919.

Application filed August 11, 1916. Serial No. 114,465.

To all whom it may concern:

Be it known that I, ROYAL C. WARRING, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Electric Signal Systems, of which the following is a specification.

This invention relates to electric signals, designed for protecting highway crossings and the like, and the invention relates particularly to a warning signal system applicable to both steam and electric railways.

The object of the invention is to provide novel, simple and effective cut-in and cut-out contacts, which are located within or along the right of way of electric or steam railroads, the said contacts being controlled by track levers which are positively operated by the flanges of the car wheels. And a further object is to provide a novel and simple arrangement of the electric circuits for controlling the warning signals, wherein all the circuits are normally open except during the approach and passage of the trains.

I attain these objects by the means set forth in the detailed description which follows, and as illustrated by the accompanying drawings, in which—

Figure 1 is a diagrammatic view of my signal system showing same applied to a double track railroad. Fig. 2 is an enlarged view partially in elevation and partially in section; showing one of the track levers in relation to the rails, and also in position to operate one of the cut-in contacts. Fig. 3 is a top plan view of the same, the contact box being in section. Fig. 4 is a diagrammatic view of my improvement; showing the application of the system to a single track railroad. Fig. 5 is a vertical cross-section taken on line 5—5 of Fig. 2. Fig. 6 is a horizontal section taken on line 6—6 of Fig. 7; showing the construction and arrangement of one of the cut-out contact boxes. Fig. 7 is a vertical cross-section taken on line 7—7 of Fig. 6. Fig. 8 is an end view of the track lever. Fig. 9 is a plan view of the track lever; showing the contact plate for a cut-out contact. Fig. 10 is a view of a modified track lever for paved streets. Fig. 11 is a detail view, on an enlarged scale of the relay illustrated diagrammatically in Fig. 1.

In the drawings, Fig. 1 illustrates the application of my signal mechanism to double track railways; either electric or steam, in which A—A' represents the rails of the east-bound track, B—B' the rails of the west-bound track, and the broken lines C a highway crossing or other danger point.

The track mechanisms of my signal are located in suitable manner on the ties entirely between the rails of each track. These devices consist of what I shall designate cut-in and cut-out contacts, each controlled by a lever which is operated by the flanges of the car wheels. I will now describe the said parts.

Referring particularly to Figs. 2 and 3, 2 represents a lever which is pivoted about midway in its length in a bracket 3, by a pin 4, said bracket being secured to one of the ties, as 5, by bolts 3'. The outer end of the lever 2 approaches close to one of the rails, as A, and is fitted with a removable striker piece 6, having a tongue 6', which enters a groove or slot 7 in the lever, and is secured in place by bolts 7'. The lever 2 is preferably disposed between the rails and the part 6 is intended to be engaged only by the flanges of the car wheels, (see F and F', Fig. 2), and for this purpose the end 6 of the lever is disposed slightly below the plane of the top of the rail A. I prefer to have the track levers of my signal mechanisms operated by the flanges of the wheels, because they are more uniform in depth and therefore more certain to strike the levers fairly and operate them positively, than if the treads of the wheels which vary greatly in breadth, are employed for the purpose. Between the bracket 3 and the rail is a solid rubber spring 8, disposed in a suitable holder 8', which may be secured to the tie by bolts or screws in the usual manner. The spring 8 tends to normally hold the striker 6 in position to be positively engaged by the flanges. A cut-in contact G is inclosed in a box 9 secured to the tie 5 in line with the lever 2, by bolts 9', the said box having a slot 10 in one end for the entrance and play of the opposite end of the lever 2. Within the box 9 is disposed a bridge 11 preferably made of fiber, an insulator, which is supported in suitable manner at the opposite sides of the box, as at 11'. 12 represents one of the contact members which is mounted upon or straddles the bridge 11, being se-

cured thereto by a bolt 12', the latter together with a nut 13 serving as a binding-post. The contact member 12 is preferably made in the form of a horse-shoe, having a relatively long free arm 12'', which is disposed beneath the bridge in line vertically with the inner end of lever 2. The member 12 is preferably made of phosphor bronze and constitutes a spring contact. The second member of the cut-in contact consists of a suitable metal plate or tip 14, which is secured to the inner end of lever 2 directly beneath the arm 12''. The cut-in contact G is normally open as shown in the drawings, and whenever the flange F of the carwheel engages the part 6 it depresses the outer end of lever 2 and instantly brings the members 12 and 14 together for closing a circuit through wires 15 and 16, which connect respectively with the post 12' and the tip 14. 17 represents a rubber buffer or spring which is preferably disposed under the inner end of lever 2 to assist in normally holding the lever in its proper position with relation to the contact member 12, as shown. H represents generally one of the cut-out mechanisms, which is inclosed in a box 20 disposed between the rails and secured to a tie, the same as the cut-in mechanisms G. Box 20 has an opening 21 in one end to receive the inner end of a rocking lever 2', which is in all respects similar both as to disposition and operation as levers 2, except that its inner end is fitted with a relatively broad contact tip 22, which is positioned directly beneath two of the horse-shoe contact members 12^a. The members 12^a are mounted side by side upon a fiber bridge 11. Each of the said members is held in place by a bolt 12', the latter being fitted with a nut 13 for connecting wires 23—24 with the said members. The tilting of the lever 2' when depressed by the flange F of the wheel, lifts the tip 22 and closes the normally open circuit comprising contact members 12^a and wires 23—24. For the double track railroads there is one cut-in contact G located between each set of rails, at a suitable distance ahead of the crossing C, for starting the sounding of the signal, and there is also one of the cut-out contacts H located between the rails of each track at or very close to the crossing C, or other point to be protected.

The circuits which are employed for operating the warning signal are as follows: 25 represents a feed wire of an electric railroad system or other source of power, to which is connected a wire 26, and in said line is disposed a resistance 27 for suitably reducing the current. The wire 26 then connects with a binding-post 26', which may represent the positive terminal (+) of a solenoid relay 28, the negative terminal (—) of said relay being represented by a binding-post 28'. The solenoid relay consists of the usual coil 28'', having a hollow center 29 in which is disposed a plunger 30. The coil 28'' is supported by the bracket 31, and the plunger 30 passes through one arm of said bracket and is held normally in its upper or released position by spring 32. 33 represents a member mounted on a lever 33', which is pivoted to the plunger 30 as at 30', and also to the bracket as at 31'. The member 33 is preferably made of fiber having on its under side two contact members 34—34', which contact respectively with contact members 35—35' and 36—36', (the latter being carried by a fiber block 37 preferably supported by the relay 28) when the relay is energized. 38 represents a wire which connects the binding-post 28' with the contact member 35, and 39 represents a wire which connects contact member 35' with the ground, as at 39'. The bell or other signal 40 is preferably located in an independent circuit consisting of a wire 41 which connects contact 36 to one pole of a battery 42, while a wire 43 connects the opposite pole of the battery with one side of the bell 40, and a wire 44 connects the other side of the bell to contact member 36'. The wire 15 of the cut-in contact G connects with the binding post 28', while wires 23 and 24 of the cut-out contacts H connect respectively with the wire 15 and the binding post 26'. All of the mechanism comprising the solenoid relay and signal and their respective circuits are suitably inclosed and are preferably located in the right-of-way near the crossing C, as indicated at S in Figs. 1 and 4. The relay 28 is shown detached in Fig. 1 for clearness, but said relay, except the armature 33 and related contacts, is omitted from Fig. 4.

The operation of my electric signal as applied to double track railways is as follows: A car traveling on track A—A' in the direction of the arrow in Fig. 1, first operates a cut-in contact G by depressing its lever 2. This lifts the opposite end of the lever and tip 14 engages the horse-shoe contact 12 allowing the current to flow from wire 25 to wire 26, resistance 27, to terminal 26', thence through the winding of relay 28 to terminal 28', wire 15, horse-shoe member 12, the tip 14 and wire 16 to the ground, as indicated in Fig. 2, or to a ground on the rail A' as shown in Fig. 1. The energizing of the relay 28 operates the plunger 30 downwardly causing armature 33 to contact with part 37. This operation causes the current to flow from the source or wire 25 through wire 26 and the winding of the relay to terminal 28', thence through wire 38 to contact members 35—34—35', and wire 39 to the supplemental ground at 39'. Although the car wheels only momentarily close the contacts 12—14, the dura-

tion is sufficiently long to energize the relay and close the circuit in which member 33 is located as described. The latter circuit remains closed until one of the cut-out contacts is subsequently operated. The operation of the armature 33 also closes an independent circuit which directly controls the bell or signal as follows: battery 42, wire 43, signal 40, wire 44, contacts 36'—34'—36 and wire 41, causing the signal to operate during the interval as described. When the car has reached or passed the crossing C the flanges of the wheels depress the lever 2' of the cut-out contact H, which is preferably located at S, the contacts 12^a and 22 are momentarily closed, which action causes a short circuit to be imposed on the terminals 26' and 28' of the relay, through wires 23 and 15, the contact members 12^a and 22, and wire 24. The result of this short circuit is to release the plunger 30 and to restore the armature 33 to its normal open position by means of the spring 32. The restoring of the member 33 as described, opens the warning signal circuit at 34'—36 and 36' and thus stops its operation. The operation of the warning signal 40 by a car going in the opposite direction on track B—B' is similar to that just described.

For single track railways, the operation is as follows: Assuming a car to be moving from left to right in Fig. 4. The car first operates cut-out H, imposing a short circuit on the terminals 26' and 28' of the relay 28, through wires 23, 15, contact members 12^a and 22, and wire 24. As the armature 33 is already in its normally open position, this operation has no effect on the warning signal circuit. As the car progresses toward the right it next operates cut-in contact G, which is preferably located a distance from the contact H in the direction of the highway crossing C equal to the distance between truck centers of the cars normally operating over the line. Contact member 14 of the lever 2 contacts with the member 12 by the depressive action of the car wheel flanges, which momentarily closes the circuit and allows the current to flow from the source 25 to wire 26, terminal 26', and the winding of a solenoid to terminal 28', wire 15, contact members 12 and 14, thence through wire 16 to the ground, or rail A'. This flow of the current operates plunger 30, closing the armature 33 upon the part 37. This action causes the current to flow from the source 25 to wire 26, winding of the relay, wire 38, contact members 35—34—35', and wire 39 to the ground at 39', thus holding the armature 33 and part 37 closed during the interval in which the car passes from cut-in contact G to the next cut-out contact H', which is located at or near the crossing C. This latter operation also closes the warning signal circuit

over wire 43, bell 40, wire 44, contacts 36'—34'—36, wire 41 and battery 42, thus causing the signal to operate during the said interval. The passing of the car over cut-out contact H' at the crossing C closes the said contact by the depressive action of the flanges of the car wheels, which action causes a short circuit to be again imposed across the terminals 26' and 28'. This short circuit releases the plunger 30, opens the signal circuit and stops the sounding of the signal. All of the circuits are then normally open and remain so until the car travels to the next cut-in contact G' beyond the crossing C. The passing of the car over the contact G' again sets the signal bell in operation, but only for a moment, because cut-in contact G' is located only a few feet from the third or last cut-out contact H'', which the car operates an instant later imposing a short circuit on the terminals 26'—28' of the relay by means of the circuit as already described. This last short circuiting silences the warning signal practically before it has begun to operate. All of the above described circuits are thus left in their normally open condition ready to be operated by another car going in the same or in the opposite direction. It will be understood from the foregoing that a car moving from right to left over a single track railroad operates the several circuits and the warning signal in exactly the same manner as described.

Fig. 10 illustrates a modified form and arrangement of the track lever 2^a, which is required for the signal system when the latter is applied to paved streets. The lever 2^a and all of the contact mechanism is inclosed in a box 51, preferably set in the pavement (not shown) so that its top comes flush with the top of the pavement. One end of the lever projects a few inches outside of the box 51 and is provided with an elevated striker piece 52, to be engaged by the flanges of the car wheels, running on the rail A. The lever 2^a is mounted in a bracket 3'', which may be cast with the box, the inner end of said lever is fitted with a contact tip 14' which when the lever is tilted engages a horseshoe contact 12^c mounted on an insulation support 53. Wires 54 and 55 and the contacts 12^c and 14' are intended to be included in one of the circuits already described, and needs no special description here.

The foregoing describes the electric circuits usually employed in connection with electric railways where the rails are bonded and serve as the conductors for the return current. It will be understood that in the case of steam railways, the return current instead of following the rails, will be conducted, in the usual manner, back to the dynamo, battery, or other source.

My electric signal system is extremely simple, reliable and positive, and can be manufactured, installed and operated at moderate expense. The operation of all of the track levers 2 of the cut-in and cut-out contact mechanisms by the flanges of the car wheels, insures the positive and certain opening and closing of the contacts, and the relay and the signal circuits. The flanges of the wheels of all cars are substantially the same depth, and these seldom wear away at the points where the flanges contact with the rocking levers. The treads of the different makes of car wheels vary greatly and cannot be depended upon for positively and surely operating the track levers. Furthermore, the novel and simple arrangement of the several electric circuits, in combination with the solenoid relay which is quick acting and positive, when combined with the flange operated track levers, enable me to provide a warning signal system which when properly installed will operate without failure.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is—

1. A signaling device adapted to be actuated by a car wheel movable over a rail having a peripheral flange portion extending below the upper surface of the head of the rail, the same comprising a shiftable signal operating member positioned adjacent the rail and adapted to be engaged only by the wheel flange, said shiftable signal actuating member comprising a lever pivoted intermediate its length and positioned at right angles to the rail, substantially as described.

2. A signaling device adapted to be actuated by a car wheel movable over a rail having a peripheral flange portion extending below the base of the rail, the same comprising a lever pivoted adjacent the rail, one end of said lever being positioned so as to

be engaged by the wheel flange and adapted to be depressed thereby, the other end of said lever having a contact portion, a housing into which the contact end of said lever extends, a contact member mounted within said housing and adapted to be engaged by the contact member on the lever when the said lever is rocked by the flange of the car wheel, for the purpose described.

3. A signaling device adapted to be actuated by a car wheel movable over a rail having a peripheral flange portion extending below the upper surface of the head of the rail, the same comprising a lever pivoted intermediate its length and located adjacent the rail and disposed at right angles thereto, one end of said lever being positioned so as to be engaged by the wheel flange, and adapted to be depressed thereby, the other end of said lever having a contact portion, a housing into which the contact end of said lever extends, a contact member mounted within said housing and adapted to be engaged by the contact member on the lever when the said lever is rocked by the flange of the car wheel, and means for mounting said contact within the housing comprising a bridge from which the contact depends.

4. A signaling device adapted to be actuated by a car wheel movable over a rail having a peripheral flange portion extending below the base of the rail, the same comprising a shiftable lever provided with a part adapted to be engaged and shifted by the flange of the wheel, a contact device adjacent said lever including a resilient contact adapted to be engaged by the lever when the latter is depressed by the flange of the car wheel, and means for supporting said contact comprising a bridge composed of insulated material, and means for normally maintaining said contacts disengaged.

In testimony whereof I affix my signature.
ROYAL C. WARRING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."