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E. McCLINTOCK.

HIGHWAY CROSSING SIGNAL FOR ELECTRIC ROADS.

APPLICATION FILED APR. 30, 1907.

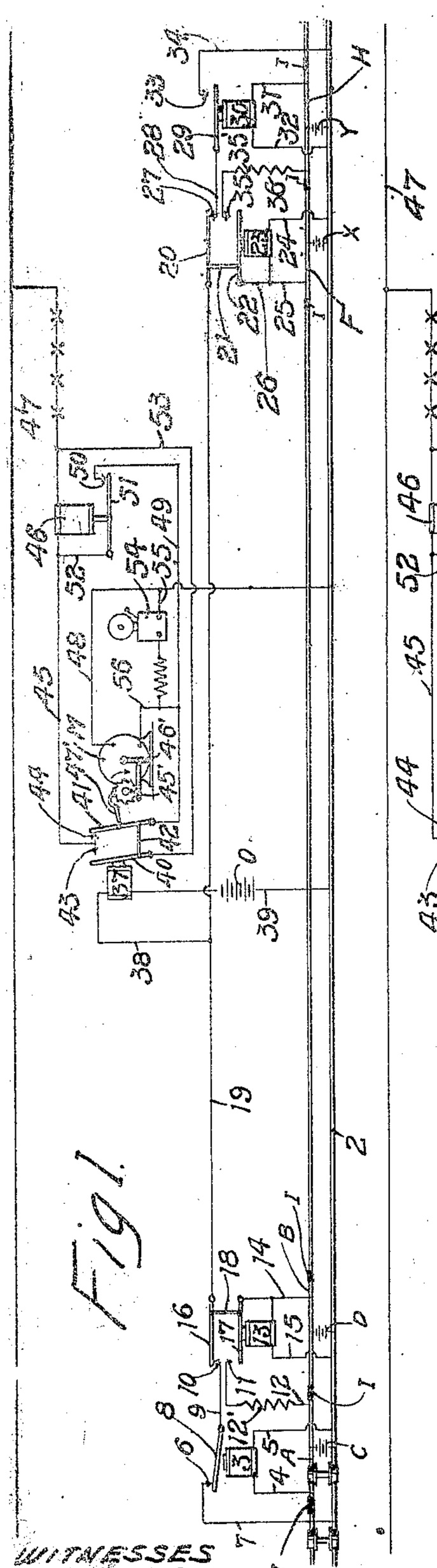

Fig 1.

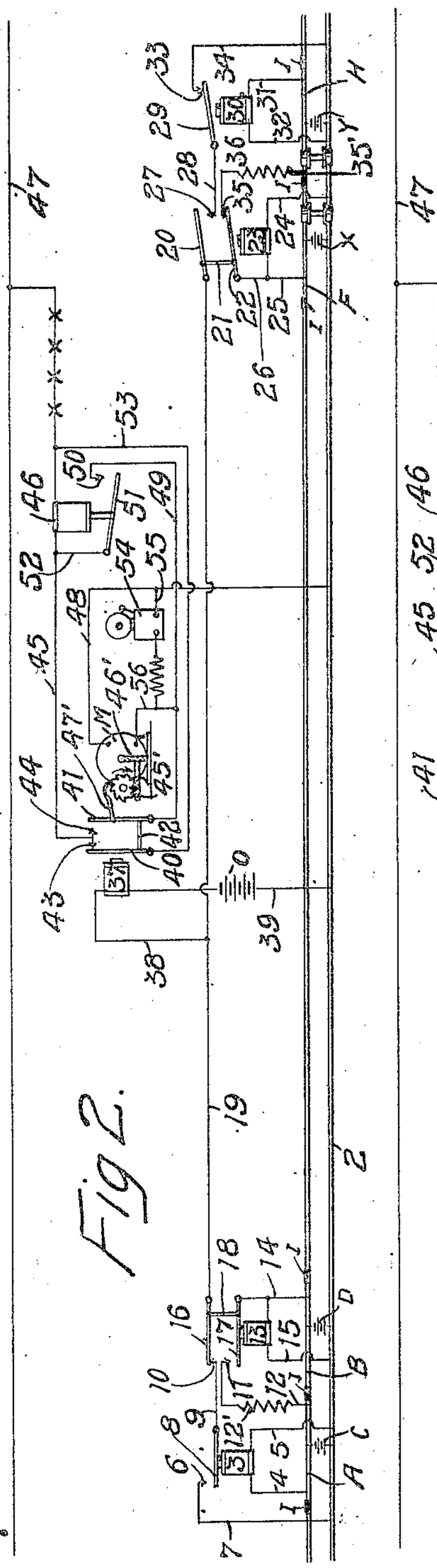

Fig 2.

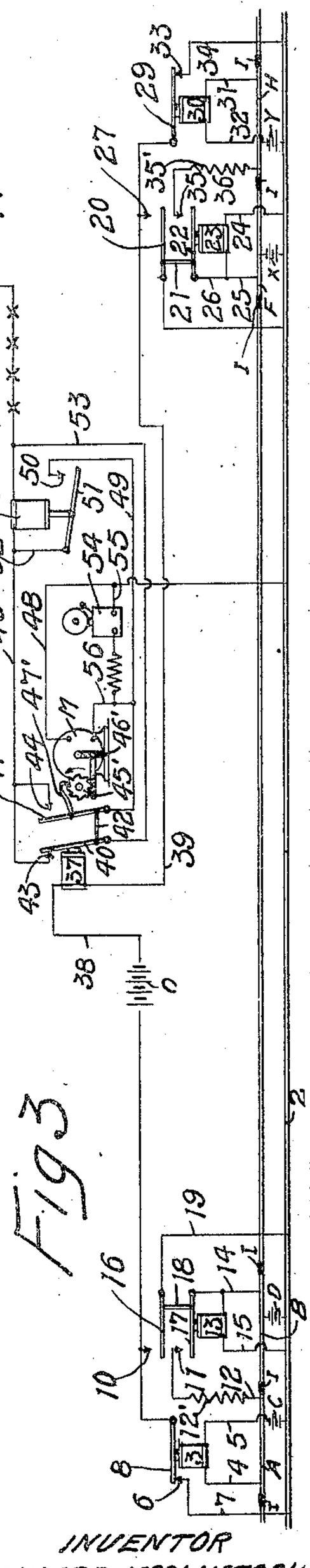

Fig 3.

WITNESSES
[illegible]
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UNITED STATES PATENT OFFICE.

EDWARD McCLINTOCK, OF ST. PAUL, MINNESOTA.

HIGHWAY-CROSSING SIGNAL FOR ELECTRIC ROADS.

No. 879,886. Specification of Letters Patent. Patented Feb. 25, 1908.

Application filed April 30, 1907. Serial No. 371,053.

To all whom it may concern:

Be it known that I, EDWARD McCLINTOCK, of St. Paul, Ramsey county, Minnesota, have invented certain new and useful Improvements in Highway-Crossing Signals for Electric Roads, of which the following is a specification.

My invention relates to electric signal devices designed particularly for application to electric or trolley lines where the track rails on one side are used for the return current.

A further object is to provide a signaling apparatus which will operate a signal for a predetermined period while the car or train is approaching the crossing from either direction and will cause the signal to be rendered in-operative when the car is leaving the crossing.

The invention consists generally in a normally closed track circuit and a normally open line circuit having a relay in connection with a time element and a signal circuit arranged to be kept closed for a predetermined period by the time element.

Further, the invention consists in providing a normally closed track circuit arranged to open the line circuit and prevent the operation of the signal when the train is leaving the crossing.

In the accompanying drawings, forming part of this specification, Figure 1 is a diagrammatic view illustrating the signaling apparatus when a car is approaching the crossing and has passed on to the insulated track sections. Fig. 2 is a similar view illustrating the position of the parts when the car is leaving the crossing. Fig. 3 is also a diagrammatic view wherein the line circuit is normally closed in distinction from the normally open line circuit shown in Figs. 1 and 2.

In the drawing, 2 represents the continuous track rails on one side utilized for the return current and A and B short sections of track separated from the other rails and from each other by suitable insulation I. Batteries C and D are connected with the sections A and B and the opposite track rails.

3 is a circuit closer connected by conductors 4 and 5 with the section A and the rails 2. A contact point 6 is connected by a conductor 7 with the rails 2 and the armature 8 of the circuit closer 3 is connected by a conductor 9 with a contact point 10. A contact point 11 has a conductor 12 and resistance 12′ connecting it with section A. A circuit closer 13 is connected by conductors 14 and 15 with section B and with the rails 2, and armatures 16 and 17 are connected together by a bar 18 and are arranged to contact with the points 10 and 11. A conductor 19 leads from the armature 16 to an armature 20 on the other side of the crossing. The armature 20 is connected by a bar 21 with an armature 22 of a circuit closer 23 in circuit through conductors 24 and 25 with an insulated track section F and with the opposite track rails 2. The armature 22 is also connected by a conductor 26 with conductor 25. The armature 20 has a contact point 27 and a conductor 28 leading therefrom to an armature 29 of a circuit closer 30 that is connected by conductors 31 and 32 with an insulated track section H and with the rails 2. A contact point 33 in the path of the armature 29 has a connection 34 with the track rails 2. Batteries X and Y connect the track sections F and H with the opposite rails. A contact point 35 is in the path of the armature 22 and is connected by a conductor 36 through a resistance 35′ with the track section H. A relay 37 has a conductor 38 leading to the line wire 19 and a second conductor 39 leading through a battery O to the rails 2. Armatures 40 and 41 connected by a bar 42 are controlled by the relay 37 and engage contact points 43 and 44 connected by a conductor 45, through a solenoid 46 with a trolley wire 47 having lamps or a suitable resistance indicated by cross marks in the conductor 45.

A ratchet wheel 45′ has a reduction gear connection 46′ with a motor M that is provided with a conductor 48 leading to the track rails 2. An arm 47′ is pivotally connected to the armature 41 and is adapted to slide over the teeth of the ratchet when said armature is moved in one direction, and to engage said teeth and prevent the armature from returning to its normal position until the ratchet is revolved by the motor. This motor and the ratchet mechanism connected therewith constitute the time element of the apparatus and the period during which the signal operates after the closing of the line circuit is governed by this element which forms the subject matter of a companion application herewith, No. 371,052, filed April 30, 1907, and hence detailed illustration and description is unnecessary herein.

A conductor 49 leads from the armature 41 to a point 50 in the path of the armature 51 of the solenoid 46. A conductor 52 connects the armature 51 with the conductor 45. A conductor 53 leads from the armature 40 to the line 45 and the signal bell 54 has a conductor 55 leading through it to the conductors 48 and 56, the latter connecting the other side of the motor and the conductor 49.

The operation of the signal device is as follows:—Normally the circuit will be closed through the circuit closers 3 and 13 and their armatures will be attracted to break the contact at the points 6 and 11. As soon, however, as a car passes upon insulated track section A the circuit closer 3 will be short circuited and becoming deënergized the armature 8 will be withdrawn and will contact with the point 6 whereupon the line circuit will be closed from the rails 2 through the conductor 7, armature 8, conductor 9, armature 16, conductor 19, relay 37, conductors 38 and 39, and battery O back of the rails 2. The energizing of the relay 37 will draw its armature 40 away from the point 43 and bring the armature 41 into contact with the point 44, whereupon a circuit will be established through the motor to the ground and the solenoid 46 will be energized to draw its armature into contact with the point 50 and close the circuit from the trolley line 47 through the motor and signal to the track rails 2 or the ground. The motor will be started and will operate the ratchet mechanism and hold the armature 41 in engagement with the point 44 for a predetermined period governed by the speed of the motor and the reduction in the gear connection between the motor and the ratchet. The solenoid will establish another circuit through conductor 49, the motor and conductor 48 to the ground. I prefer to use a solenoid in this circuit with carbons at point 50 to prevent arcing at contacts 43 and 44. As soon as the car truck reaches the section B the circuit closer 13 will be deënergized and the relay circuit opened at point 10, whereupon the relay 37 will release its armature, but the opening of the signal circuit will be prevented by the motor and the time mechanism connected therewith. The signal will therefore continue to operate while the car is approaching the crossing. The car having passed over the crossing will engage the insulated rail section F and short circuit the closer 23, allowing its armature to contact with the point 35 and establishing another path through conductor 36 and insulated section H. The line circuit, however, will be opened at contact point 27. When the truck reaches the section H the relay 23 will remain short-circuited until the trucks all leave section H, this keeping the line circuit open and preventing the signal from being operated when the train is leaving the crossing. When a car is approaching the crossing from the right of the figure and passes on to the insulated rail section H, the line circuit will be closed and the relay energized to close the signal circuit and operate the signal and the time element will again be called into action to regulate the period of operation of the signal. When the car leaves the crossing and passes on to the insulated rail sections B and A the line circuit will be opened and operation of the signal prevented. Thus the signal circuit will be closed for a certain period when a car is approaching the highway crossing from either direction, but will remain open and the signal will be inoperative when the car is leaving the crossing and moving in either direction. The system may also be used with a closed line circuit as shown in Fig. 3, and in such case the signal will be closed and the signal operated whenever any part of the system is out of order. The operation of the track relays will be substantially the same as those described above and the same reference figures may be used for each. In the time element, however, a ratchet 45″ is employed which is the reverse of the one described and is operated when the relay opens the circuit instead of closing it as in the normally open line circuit.

I claim as my invention:—

1. The combination, with a normally closed track circuit arranged to be short circuited by the passage of a car approaching a highway crossing, of a line circuit closed by the short-circuiting of said track circuit, a relay in said line circuit, a signal circuit normally open and controlled by said relay, a time element arranged to prevent the opening of said signal circuit for a predetermined period after said line circuit is opened and while the car is approaching the crossing, a second normally closed track circuit on the opposite side of the crossing from said first named track circuit and arranged to open said line circuit and prevent the operation of said signal when the car is leaving said crossing.

2. The combination, with the track rails having a highway crossing, of the insulated track sections on one side of the crossing and on the same side of the track, track circuits connected with said sections and the opposite rails and normally closed, a line circuit normally open and having a relay, a signal circuit controlled by said relay and having a signal, a time element arranged to prevent the opening of said signal circuit when said line circuit is opened after a car has passed over said insulated rail sections moving toward said crossing, insulated track sections on the other side of the crossing and on th same side of the track and over which t car passes leaving said crossing, track cir cuits connected with said last named sections, and means whereby said last named track

circuits will open said line circuit and prevent the operation of said signal when the car is leaving said crossing.

3. The combination, with the track rails having a highway crossing, of insulated track sections provided in said rails on each side of said crossing and on the same side of the track, normally closed track circuits provided in connection with said sections and arranged to be short circuited by the passage of a car over said crossing, a line circuit, a relay in said line circuit, a normally open signal circuit controlled by said relay and having a signal, a time element arranged to keep said signal circuit closed and continue the operation of said signal for a predetermined period after a car has passed over said insulated rail sections and is moving toward the crossing from either direction and said track circuits being arranged to prevent the operation of said relay and the closing of said signal circuit when a car is leaving the crossing and moving in either direction.

4. In an electric railway, the combination with the track rails and a highway crossing, of insulated track sections provided in said rails on each side of said crossing and on the same side of the track, normally closed track circuits provided in connection with said sections and arranged to be short circuited by the passage of a car over said sections, a line circuit, a relay in said line circuit, a normally open signal circuit controlled by said relay and having a signal, a time element arranged to keep said signal circuit closed and continue the operation of said signal for a predetermined period after a car has passed over said insulated rail sections and is moving toward the crossing from either direction, a trolley wire, a solenoid in circuit with said wire and with said relay, and time element and said track circuits being arranged to prevent the operation of said relay and the closing of said signal circuit when a car is leaving the crossing, moving in either direction.

In witness whereof, I have hereunto set my hand this 20th day of April 1907.

EDWARD McCLINTOCK.

Witnesses:
RICHARD PAUL,
J. B. EVA.