(No Model.)

2 Sheets—Sheet 1.

J. W. RIGGS.

RAILWAY SIGNALING DEVICE.

No. 440,926. Patented Nov. 18, 1890.

Fig. 1.

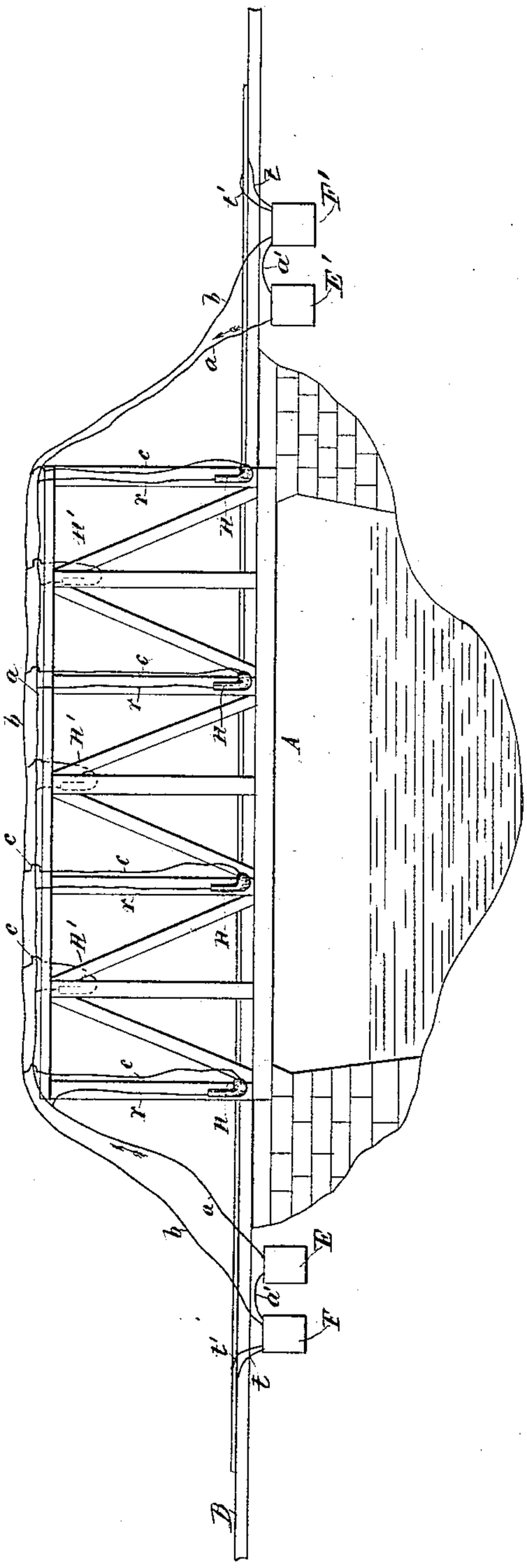
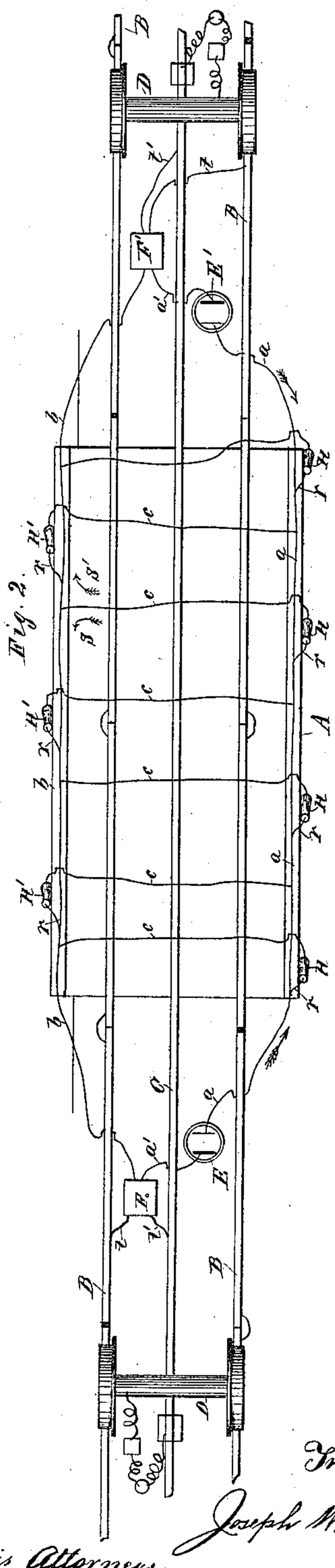


Fig. 2.



Witnesses
A. K. Upshaw
Emma F. Elmore.

Inventor
Joseph W. Riggs
By his Attorneys
Williamson & Blodgett

(No Model.) 2 Sheets—Sheet 2.

J. W. RIGGS.

RAILWAY SIGNALING DEVICE.

No. 440,926. Patented Nov. 18, 1890.

Fig. 3.

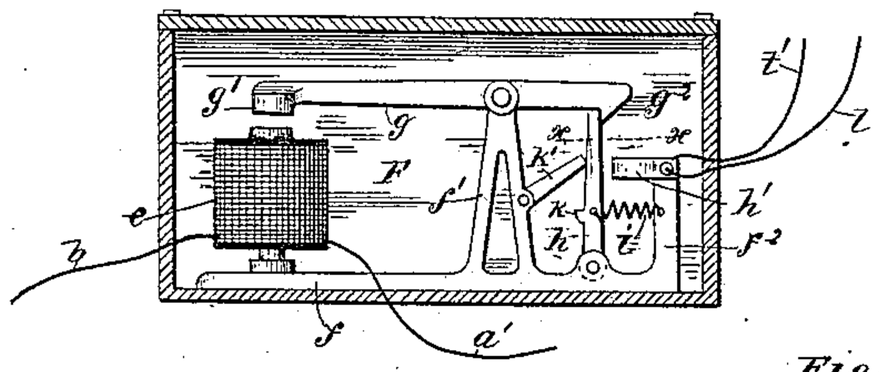
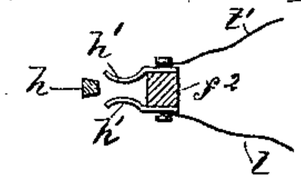


Fig. 4.



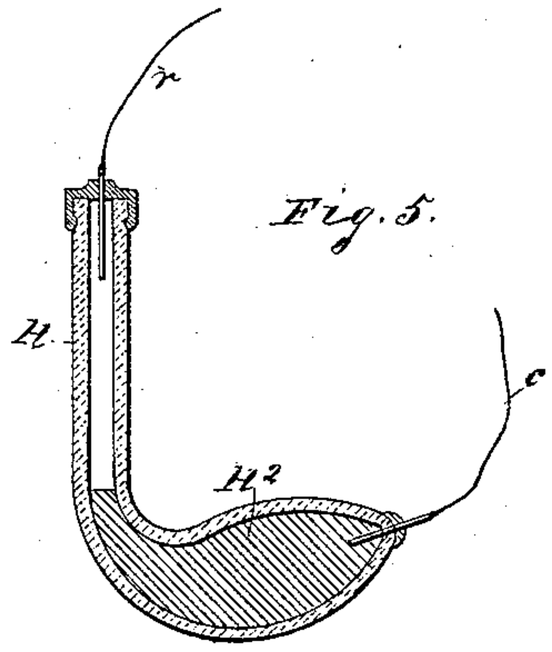


Fig. 5.

Witnesses
A. H. Upshaw
Emma F. Elmore

Inventor
Joseph W. Riggs
By his Attorneys
Williamson and Blodgett.

UNITED STATES PATENT OFFICE.

JOSEPH W. RIGGS, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE RIGGS ELECTRIC TRAVELING DANGER SIGNAL COMPANY, OF SAME PLACE.

RAILWAY SIGNALING DEVICE.

SPECIFICATION forming part of Letters Patent No. 440,926, dated November 18, 1890.

Application filed September 12, 1889. Serial No. 323,787. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. RIGGS, a citizen of the United States, residing at Minneapolis, in the county of Hennepin, State of Minnesota, have invented a new and useful Improvement in Railway Signaling Devices, of which the following is a description.

In an application filed contemporaneously herewith, (Case A,) Serial No. 322,630, I have shown and described an electric signaling system which will warn the engineers of locomotives either approaching or following each other when the trains are upon certain sections of the track, and in this system I provide track-rails divided into sections and arrange the rails so that they break joints one with the other. I also provide insulating material between the meeting ends of the rails and locate a single continuous insulated conductor intermediate the said rails. On each locomotive I mount suitable electric generating and signaling devices and a brush, trolley, or other contrivance adapted to engage with the insulated conductor.

My present invention is designed to prevent accidents to trains when bridges are rendered unsafe for traffic by fire or are destroyed thereby, and while it embodies the details of the before-mentioned application it has, in addition thereto, contrivances which will close the electric circuit on wires connected to a bridge constructed of combustible material, if the bridge is on fire, and will also close one end of a circuit, including one rail of the track and the intermediate conductor, and cause the alarm to be sounded in the cab of a locomotive approaching the bridge when such locomotive arrives upon the section of track at either end thereof. Adjacent to each end of the bridge I locate, either in the abutment or embankment thereof, an electric battery and a circuit-closer, said batteries being of equal strength. These devices are represented as placed in different locations; but in practice both will be contained in the same box. Main-circuit wires are connected to each battery and to the bridge. The poles of each battery are in connection with the main-circuit wires and with the magnet of the circuit-closer. The currents from the batteries flow in opposite directions, and being of equal strength neutralize each other. Attached at various points along each side of the bridge are a series of thermostats in connection by branch or shunt wires with the main-circuit wires. Any well-known form of thermostat adapted to establish an electrical connection may be employed; but I have shown a thermostat consisting of a receptacle containing a body of mercury which receives at each end the terminals of the branch wires and of wires connecting with the main circuit. Connected by a wire with each battery is a circuit-closer consisting of an electro-magnet, a pivoted lever having an armature at one end and a latch at the other, and a pivoted switch-piece normally held out of engagement with contact-springs on a vertical standard mounted on the frame of the circuit-closer, this standard having binding-posts, to which the terminals of wires hereinafter described are respectively connected. A section of track constructed as set forth in my before-mentioned application is laid across the bridge, and the wires connected to the standard of the circuit-closer are respectively attached to one of the track-rails and to the single continuous insulated conductor.

Reference being had to the accompanying drawings, Figure 1 is a side elevation of a bridge, showing my invention as applied thereto. Fig. 2 is a plan view thereof, illustrating the track-rails and single insulated conductor, and representing diagrammatically parts of the trucks of two locomotives equipped with the electric generating and signaling devices before mentioned. Fig. 3 is a view of the circuit-closer, and Fig. 4 is a section on the line *x x* thereof. Fig. 5 is a vertical section of a thermostat.

Similar letters refer to similar parts throughout the several views.

A is a bridge, shown as spanning a watercourse or ravine.

B is the main track, the rails of which are divided into sections arranged to break joints and having insulating material between the meeting ends thereof, and C is a single continuous insulated conductor intermediate the track-rails.

D D represent parts of the trucks of locomotives carrying suitable electric generating

and signaling appliances. As thus far described, the track and its accessories are the same as those set forth in Serial No. 322,630, to which reference has been given.

E is a battery or batteries coupled in cells, which is suitably secured in the abutment at one end of the bridge or in the embankment adjacent thereto, and E′ is a similar battery mounted in the same manner at the other end of the bridge. Connected to a like pole of each battery is a main-circuit wire *a*, which is secured in any desired manner to the bridge. Batteries E and E′ are of equal potential, and as the current from the like pole of each battery flows in an opposite direction the two currents neutralize each other.

F F′ are circuit-closers located, respectively, at each end of the bridge. Each circuit-closer comprises an electro-magnet *e*, connected by a wire *a′* with the battery, and also with the main-circuit wire *b*, a frame *f*, having standards *f′ f²*, composed of insulating material, a pivoted lever *g*, having an armature *g′* at one end and a latch or hook g^2 at the other, a pivoted switch *h*, and contact-springs *h′*, connected with one of the main-track rails and with the insulated conductor.

Normally the parts of the circuit-closer are in the positions represented by Fig. 3, and the circuit remains open; but so soon as the magnet is energized it attracts the armature, raising the hook g^2 and releasing the pivoted switch *h*. A spring *i* will then draw the pivoted switch between the contact-springs *h′ h′*, which are connected by wires *t t′* with one of the track-rails, and also with the continuous insulated conductor. Pivoted switch *h* is provided with a shoulder *k*, and a gravity-latch *k′*, pivoted to standard *f′*, drops when the switch is pulled forward and locks it between the contact-springs until it is restored by hand to its former position. Connected to the main-circuit wires *a b* are a series of branch wires *c c*, and in communication with each of the main and branch wires are two series of thermostats H H′, series H being secured to the frame-work on one side of and series H′ on the other side of the bridge. The terminals of the branch wires enter the thermostats at one end, and the terminals of wires *r*, connected with the main-circuit wires *a b*, are received in the other ends. The thermostats are either composed of insulating material or are provided with plugs or caps of this material in which the terminals are received. Each thermostat contains a body of mercury H^2.

Having thus described my invention, the operation thereof is as follows: As regards the track-rails, insulated conductor, and locomotives, the section of track laid across the bridge is but a continuation of the main track and will operate in the same manner as the similar elements heretofore described in this specification; but should the bridge be on fire the heat will cause the mercury in the thermostats to expand, fill the thermostats, and establish connection with the wires *r c*. As soon as this is accomplished, a new circuit over the main wires *a b* is established, and the electric current from the battery passes into and energizes magnet *e*, which then attracts armature *g′* and withdraws hook g^2 from pivoted switch *h*. Spring *i′* then pulls the switch between the contact-springs *h′ h′*, which are normally insulated from each other, and the dog or latch *k′* drops by gravity and locks the switch in said position. Should a locomotive provided with the electric generating and signaling devices described in my application Serial No. 322,630 before mentioned come onto the section of track adjacent to either end of the bridge while burning, or near the place where the bridge stood, if it is destroyed, the current from the battery thereof will traverse one of the track-rails, pass through the wire *t*, contact-springs *h′ h′*, wire *t′*, and insulated conductor C, establishing the circuit through the alarm mechanism of the locomotive and warning the engineer of impending danger. It will be seen that the heat from the burning bridge only acts to establish a new circuit through the main wires, whereby the magnet is energized to withdraw the lever which holds the pivoted switch out of engagement with the contact-springs, and that so soon as this lever is withdrawn the switch will be instantly locked between said springs and the circuit between the track-rail and insulated conductor closed, and that this circuit will remain closed until the switch is returned to the position shown in Fig. 3. Consequently, whether the bridge be entirely destroyed or be so weakened by fire as to be unsafe for traffic, the alarms on the trains approaching from either direction will be sounded and all danger of derailment avoided.

I have shown the wires and thermostats as attached to the bridge in a certain manner in order to more clearly illustrate the invention; but it is obvious that they may be connected to the floor of the bridge or any desired part without departing from the spirit thereof.

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

1. The combination, with track-rails and a conductor, of an electric battery, a circuit-closer in electrical connection with one of the rails and the conductor, a main circuit, and a thermostat in electrical connection therewith, substantially as and for the purpose specified.

2. The combination, with track-rails insulated from each other, of a conductor, a battery, a circuit-closer in electrical connection with one of the rails and the conductor, a thermostat mounted on a bridge, and a car provided with electric generating and signaling devices, substantially as and for the purpose specified.

3. The combination, with a bridge carrying a section of track, the rails of which are arranged in sections with insulating material

between their meeting ends and a conductor, of a main circuit, a battery and circuit-closer, the latter electrically connected with one of the rails and with the conductor located adjacent to each end of the bridge, and a thermostat mounted on the bridge and in electrical connection with the main circuit, substantially as set forth.

4. The combination, with a railway-track, the rails of which are arranged in sections and are insulated at their ends, of a conductor located between the said rails, a bridge carrying a like section of track, a series of thermostats mounted on the bridge, a main circuit in connection with said thermostats by branch wires, an electric battery, and a circuit-closer connected with the main circuit, a rail of the track, and the conductor, substantially as set forth.

5. The combination, with a main circuit, of an electro-magnet, a pivoted lever having an armature at one end and a latch at the other, a pivoted switch, and a pair of contact-springs between which the switch is adapted to pass, and binding-posts, substantially as set forth.

6. The combination, with a main circuit, of an electro-magnet, a pivoted lever having an armature at one end and a latch at the other, a pivoted switch, a pair of contact-springs, and a gravity-dog for locking the switch in position between the springs, substantially as set forth.

7. In combination with the main circuit, a circuit-closer electrically connected with the track and conductor, as set forth, a bridge, and a thermostat mounted thereon and in electrical connection with the main circuit, substantially as set forth.

JOSEPH W. RIGGS.

In presence of—
WM. H. BLODGETT,
A. H. OPSAHL.