

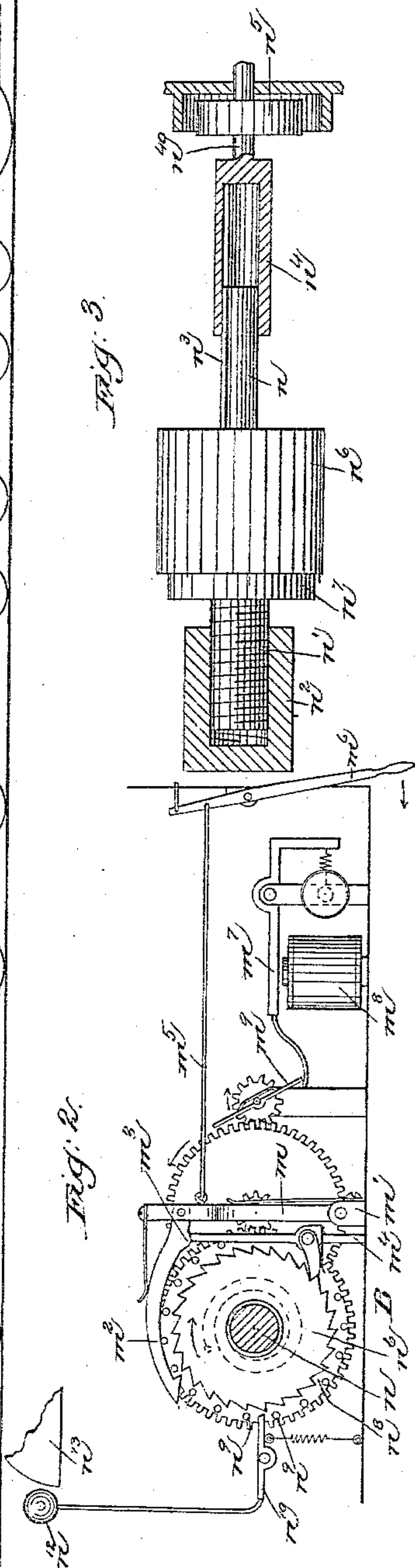
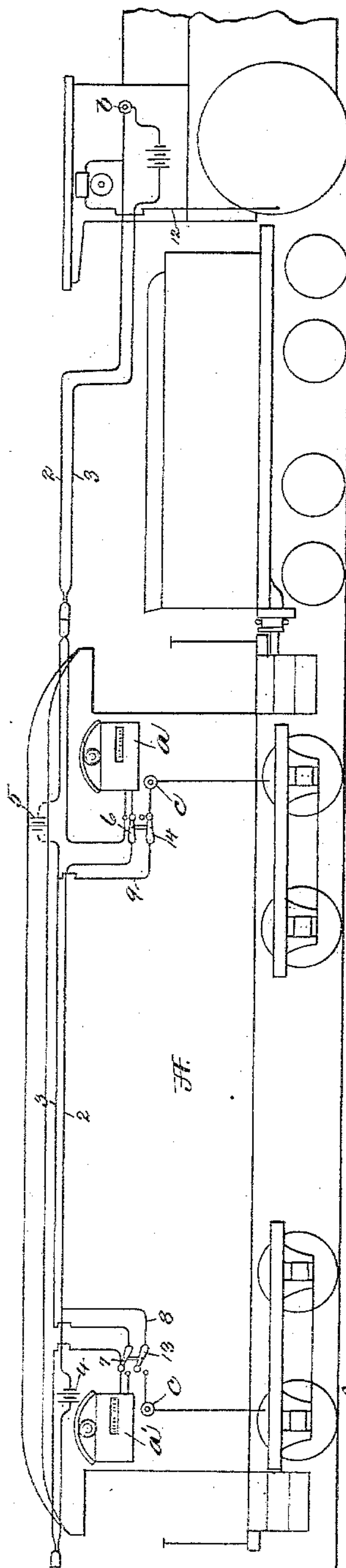
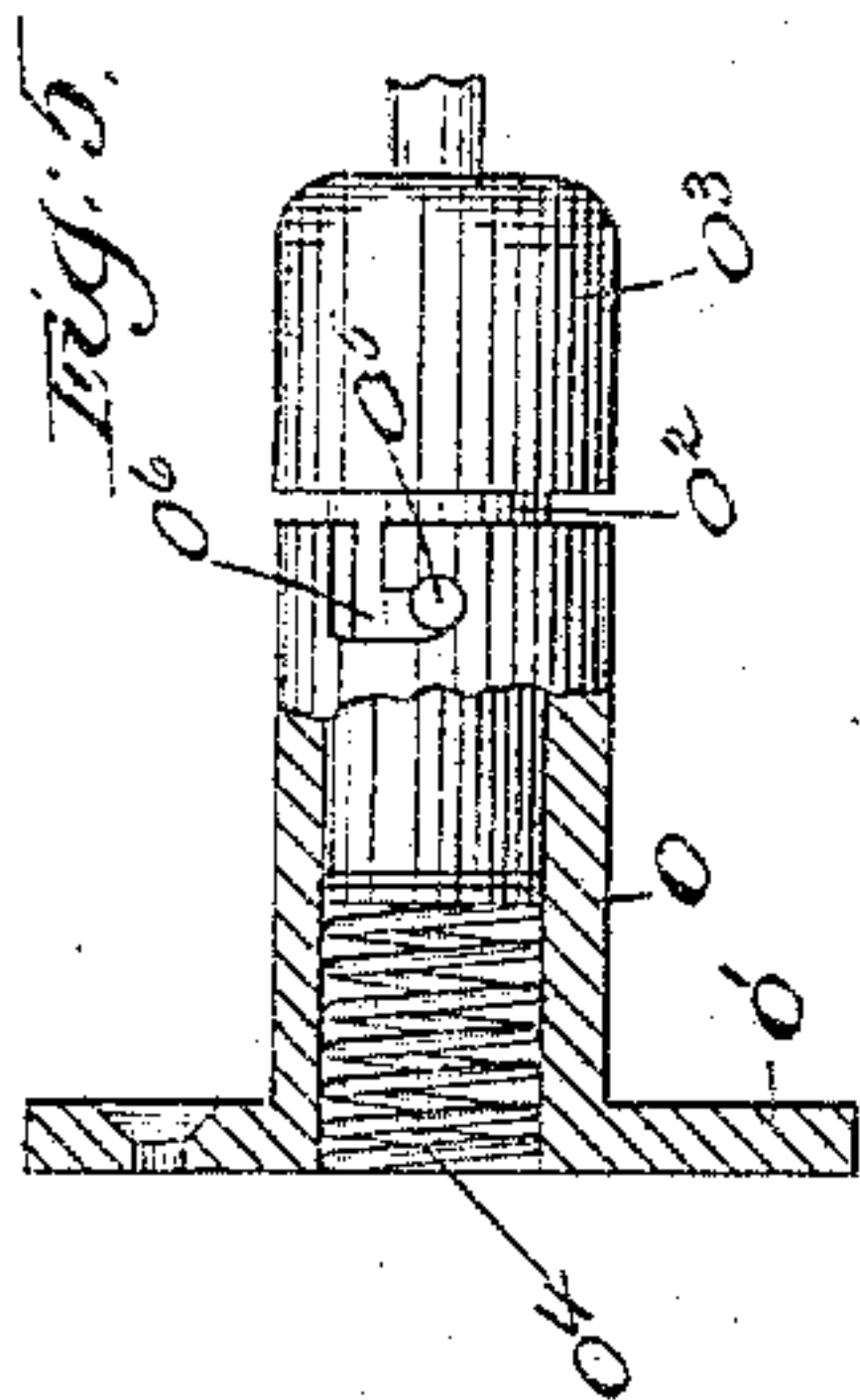
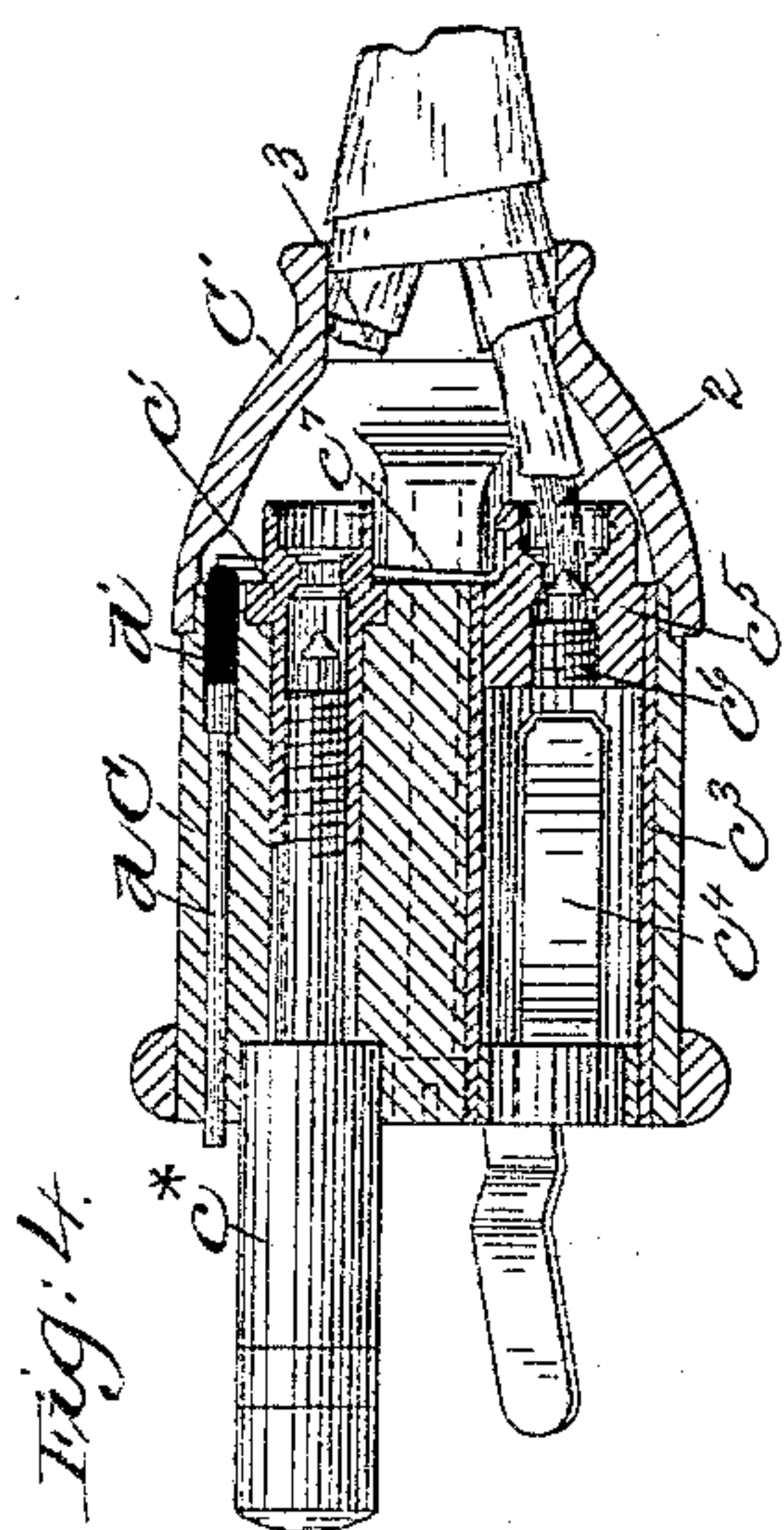
(No Model.)

J. H. BICKFORD.

COMBINED STATION INDICATOR AND SIGNALING APPARATUS FOR  
RAILWAY TRAINS.

No. 381,669.

Patented Apr. 24, 1888.



Witnesses  
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# UNITED STATES PATENT OFFICE.

JOHN H. BICKFORD, OF SALEM, MASSACHUSETTS.

COMBINED STATION-INDICATOR AND SIGNALING APPARATUS FOR RAILWAY-TRAINS.

SPECIFICATION forming part of Letters Patent No. 381,669, dated April 24, 1888.

Application filed November 26, 1886. Serial No. 219,946. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. BICKFORD, of Salem, county of Essex, and State of Massachusetts, have invented an Improvement in  
5 a. Combined Station-Indicator and Signaling Apparatus for Railway-Trains, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.  
10 This invention has for its object to provide a train of cars with an electric-circuit station-indicator included in the circuit which shall display a suitable sign to visually indicate the "next station," and which may be operated  
15 from a distant point—as from the locomotive, for instance—to display one indication or sign after another, and with signaling apparatus, also included in the circuit, whereby an audible alarm—such as a bell located in the en-  
20 gine-cab—may be operated by controlling devices located upon the train to indicate to the engineer when to start or stop the train.

In accordance with this invention two station-indicators, preferably of the class shown  
25 and described in application for Letters Patent, Serial No. 219,919, filed by me November 26, 1886, are placed in each car, one at each end, and connected in circuit with suitable batteries. Suitable switches are provided,  
30 whereby one or the other indicator of each car is cut out of circuit, so that only that indicator at the front end of the car will remain in circuit. A circuit-controller is placed in the en-  
35 gine-cab or at some other convenient place for effecting the operation of the indicators of each car, or that one which remains in circuit. Suitable circuit-controllers are also placed within or upon the cars, connected in ground  
40 terminals or branches joined to the main line, and an audible alarm is located within the engine-cab, also connected in a ground terminal or branch connected with the main line, so that when any circuit-controller within the  
45 car is operated the audible alarm within the engine-cab will respond. The audible alarm employed within the engine-cab is set in operation by a motor which is released by an electro-magnet, and the said motor is preferably  
50 wound up by a cord or chain connected with one of the levers which is operated by the en-

gineer—such, for instance, as the whistle-operating lever. A novel form of coupling is also employed, which will make better or more positive connection than those heretofore known to me.

Figure 1 shows in side elevation a portion of  
55 a train of cars provided with indicators and signaling devices embodying this invention; Figs. 2 and 3, details of the alarm located within the engine-cab referred to; Fig. 4, a  
60 longitudinal section of one-half of the coupling, and Fig. 5 a side elevation and partial section of one of the connecting devices for connecting a terminal of the line outside with  
65 a terminal of the line inside the car.

Two station-indicators, *a a'*, are placed one  
at each end of the car A, such station-indicators preferably being constructed as shown and described in the application above referred to. These station-indicators contain a series of  
70 cards or signs suitably lettered to indicate the next station, and are arranged to be moved to present one or another sign at a suitable display-opening, the mechanism employed to move the indicators being controlled by an  
75 electro-magnet.

Two open battery-lines, 2 3, pass through the car, each containing a suitable battery, as 4 5. The indicator *a* is connected with the battery-  
80 line 2 and the indicator *a'* with the battery-line 3, and suitable switches, 6 7, are employed for cutting in and out the said indicators, in order that the indicator at the forward end of the car may always be utilized and the indi-  
85 cator at the rear end of the car cut out. The battery-lines extend through several cars of the train, and also to the engine-cab, being joined by suitable couplings, to be described.

In the engine-cab a circuit-controller (shown as a push-button, *b*) is arranged to connect the  
90 two lines 2 3 when operated, so that the engineer can by moving the circuit-controller cause the station-indicators to operate.

If it should be desired that the brakeman or other train-hand should operate the station-  
95 indicators, the circuit-controller *b* will be located at a convenient locality for him to do so.

Two ground terminals or branches, 8 9, are joined one to each line 2 3, and another ground terminal or branch, 12, leads from the line 2 100



within the engine-cab. The ground branch 12 contains an audible alarm or bell, B, and the ground branches 8 9 each contain a circuit-controller, herein shown as a push-button, *c*, so that when the circuit-controller *c* is operated a ground-circuit is formed over a portion of the battery-line, causing the audible alarm within the engine cab to operate. The ground branches 8 9 are each provided with a switch, 13 14, to break them when desired. The switches 13 14 are preferably joined to the switches 6 7, to thus form a four-point switch, so that both switches may be moved at one operation to cut in or out one or the other indicator, and also a ground-terminal.

The two lines 2 3 of each car are joined with the corresponding lines of the next car and with the engine-cab by couplings, herein shown as composed of two like halves or portions, one of which is shown in sectional view, Fig. 4. This half or portion consists of an insulating block or frame, C, having a metal cap or end piece, C'. The portion C is provided with a metal pin, *c*\*, screwed into the metal socket *c*', said pin *c*\* having a conical point, against which the terminals of the line 3 bear. The portion C also has a metal socket, *c*<sup>3</sup>, provided at its interior with two flat springs, *c*<sup>4</sup>, one at each side, and also with a metal block, *c*<sup>5</sup>, securely fitted into the socket, the said block *c*<sup>5</sup> having a conical-pointed screw, *c*<sup>6</sup>, or pin, against which the terminal of the line 2 bears. A metal contact-piece, *c*<sup>7</sup>, is secured to the block *c*<sup>5</sup>, it extending laterally to bear upon the shoulder formed upon the block or socket *c*'.

A pin, *d*, is fitted into the block C, it having an insulated end portion, *d*', which, when the two halves or portions of the coupling are placed together, bears against the contact-spring *c*<sup>7</sup> and removes it from the shoulder formed upon the socket *c*' to break the contact between the block *c*<sup>5</sup> and the socket *c*'.

The companion half of the coupling is arranged like the half or portion just described; but when in operation its position is reversed, so that the pin corresponding with the pin *c*\* enters between the springs *c*<sup>4</sup> of the socket *c*<sup>3</sup> and the pin *c*\* enters between the springs of the other half corresponding to the springs *c*<sup>4</sup>.

The lines 2 3 of each car are provided at each end with one half or portion, as C, of the coupling, and arranged reversely with relation to each other, so that each battery-line, including an indicator, is connected with the pin *c*\* and the corresponding socket of each portion of the coupling. By following out this arrangement it will be seen that the couplings may be joined between any two cars irrespective of their position, and as the ground-terminal, which is in circuit at the time the forward indicator is in circuit, leads from the line containing the other indicator, which is cut out, and the audible alarm is also connected to the line which joins the socket *c*<sup>3</sup> of the coupling, to which is connected the terminal of the line containing the indicator which is cut out,

a ground-circuit may always be formed upon operating the circuit-controller within the car.

When one half of the coupling is at the rear-most end of the train and no companion half to couple to it, the pin *d* permits the spring *c*<sup>7</sup> to bear upon the shoulder formed upon the block or socket *c*', to thus complete the two lines 2 3.

The point of connection of the line from the exterior to the interior of the car consists of a connecting device, shown as a hollow or tubular receiver, *o*, having a flange, *o*', by which the receiver is secured to the exterior of a car. A connector, shown as a short plug, *o*<sup>2</sup>, having a shouldered end *o*<sup>3</sup>, is attached to one terminal of the line, said plug entering the receiver *o* and bearing against a spring, *o*<sup>4</sup>, while a pin, *o*<sup>5</sup>, secured to the plug *o*<sup>2</sup>, enters a slot, *o*<sup>6</sup>, to thereby fasten the connector to the receiver. The wire within the car passes through and bears against the face of the flange *o*', so that the electrical connection is made through the connector and receiver.

The audible alarm in the engine cab is arranged to be wound up by some lever which is employed to control some other work, and is released by an electro-magnet to operate a suitable striking-lever to a gong, such an audible alarm consisting of a shaft, *n*, one end of which is screw-threaded, as at *n*', and turns in a socket or bearing, *n*<sup>2</sup>, while the other end has a spline, *n*<sup>3</sup>, which follows in a guideway cut in a sleeve, *n*<sup>4</sup>, secured to a shaft, *n*<sup>10</sup>, mounted to rotate in suitable bearings, said shaft having attached to it the main spring *n*<sup>5</sup>. The shaft *n* also has secured to it a ratchet-toothed drum, *n*<sup>6</sup>, provided with a smooth-surfaced hub, *n*<sup>7</sup>. A wheel, *n*<sup>8</sup>, is secured to the sleeve *n*<sup>4</sup>, or to the shaft to which the sleeve is attached, said wheel having pins or studs *n*<sup>9</sup>, which normally bear upon one end of the toothed striking-lever *n*<sup>10</sup>, the opposite end of the striking-lever carrying the hammer *n*<sup>12</sup>, which strikes the gong *n*<sup>13</sup>.

A suitable upright, *m*, pivoted to a base, *m*', carries a loosely-pivoted spring-controlled pawl, *m*<sup>2</sup>, which engages the teeth of the drum *n*<sup>6</sup>, the under side of the said pawl having a cam-surface, *m*<sup>3</sup>, which bears upon the upper end of a standard, *m*<sup>4</sup>; or it may bear upon a friction-roller carried by said standard.

The function of the standard *m*<sup>4</sup> and the co-operating cam is to retain the pawl *m*<sup>2</sup> normally disengaged from the ratchet-toothed drum *n*<sup>6</sup>, so that the latter may rotate freely in the direction of the arrow shown in Fig. 2, but to engage said ratchet-toothed drum and rotate it in the opposite direction when the pivoted lever *m* is moved by a suitable cord, *m*<sup>5</sup>, or other means, such cord *m*<sup>5</sup> being herein shown as connected to the outer end of the whistle-operating lever *m*<sup>6</sup>. The spring is released to operate the striking-lever by the armature *m*<sup>7</sup> of the magnet *m*<sup>8</sup>, releasing the fly or escapement to thereby permit the train of gearing to rotate.

As the lever *m*<sup>6</sup> may be operated many times, means are provided to prevent winding



the motor too tightly, such means consisting of a drum,  $n^6$ , provided with a smooth-surfaced hub,  $n^7$ , so that as the shaft  $n$  is rotated and moved into the sleeve  $n^4$  the pawl will finally bear upon said hub  $n^7$ , and with the pawl in this position the lever can be moved as many times as desired without further rotating the shaft  $n$ .

By employing a round circuit and ground terminals or branches, as shown and described, less battery is required, and also the cost of wiring reduced, and any accident to the circuit is quickly apparent.

In another application filed by me, Serial No. 239,756, an electro-mechanical bell is shown, embodying a motor, a striking-lever operated by it, a releasing device, and a winding device for the motor, and a disengaging device for throwing out the winding device, and means for moving the winding device to wind the motor automatically, so that I do not herein broadly claim such devices.

I claim—

1. A signaling system for railway-trains, which consists of an electric circuit and station-indicators, substantially as described therein, and a circuit-controller for operating the station-indicators, combined with an audible alarm located upon the engine and connected in a ground branch or terminal joined to the main circuit, and a circuit-controller located within or upon the car, also connected in a ground branch or terminal joined to the main line for operating the audible alarm, substantially as described.

2. In a signaling system for railway-trains, a main electric circuit and station-indicators placed within the cars and connected with the circuit, and a circuit-controller, also connected with the circuit, for operating the station-indicators, combined with an audible alarm, also connected with the circuit, but responsive to current changes of different character from that employed to operate the station-indicators, and circuit-changers for operating the audible alarm, substantially as described.

3. In a signaling system for railway-trains, an electric circuit composed of two battery-lines, as described, and two indicators located within a single car and placed one in each line, combined with a switch for cutting out the rearmost indicator of the car, substantially as described.

4. In a signaling system for railway-trains, two station-indicators in each car and circuit-controllers therefor connected in a round circuit, an audible alarm located at or upon the engine, and circuit-controllers therefor in-

cluded in ground terminals or branches leading from the round circuit, combined with couplings for connecting the lines of one car with the corresponding lines of the next car to continue the circuit, all substantially as described.

5. In an electric circuit having ground-terminals, as described, two station-indicators and a circuit controller therefor, an audible alarm and a circuit-controller therefor, and switches for simultaneously cutting out the rearmost indicator and ground-terminal, combined with couplings for connecting the lines with corresponding lines to continue the circuit, substantially as described.

6. A coupling device for connecting electric circuits, which consists of two like halves or portions, each consisting of an insulating-block,  $C$ , having metal sockets  $c'$   $c^3$ , a pin,  $c^*$ , fitted into one of the sockets and contact-springs secured within the other socket, the terminals of the lines making electrical connection through the sockets, substantially as described.

7. A coupling device for connecting electric circuits, which consists of two like halves or portions, each consisting of an insulating-block,  $C$ , having metal sockets  $c'$   $c^3$ , a pin,  $c^*$ , fitted into one of the sockets and contact-springs secured within the other socket, and a contact spring or strip,  $c^7$ , substantially as described.

8. A coupling device for connecting electric circuits, which consists of two like halves or portions, each consisting of an insulating-block,  $C$ , having metal sockets  $c'$   $c^3$ , a pin,  $c^*$ , having the conical point against which one terminal of the wire bears, said pin being fitted into one of the sockets and contact-springs secured within the other socket, and a conical-pointed screw,  $c^6$ , against which another terminal of the wire bears, substantially as described.

9. In an electric circuit, the bell  $B$ , consisting of motor and laterally-movable winding-shaft for winding it, the ratchet-toothed drum having the smooth-faced hub  $n^7$ , the pawl for rotating the shaft to wind the motor, combined with an electro-magnet for releasing the motor, and a striking-lever operated by the motor when released, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. BICKFORD.

Witnesses:

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F. L. EMERY.