(No Model.)

3 Sheets—Sheet 1.

W. VOGEL.

ELECTRIC RAILWAY SIGNAL.

No. 305,359. Patented Sept. 16, 1884.

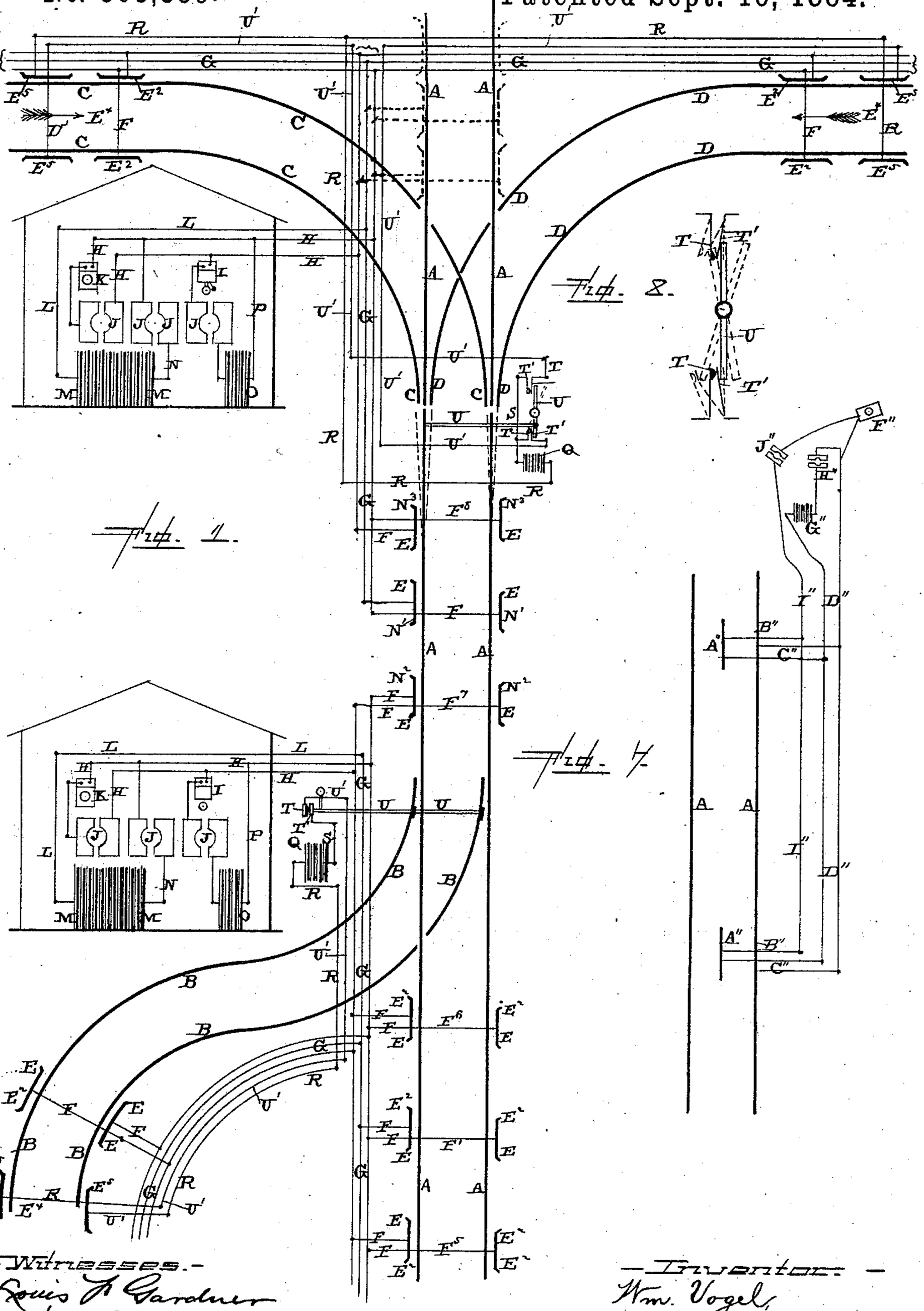

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses.
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ELECTRIC RAILWAY SIGNAL.

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Fig. 3.

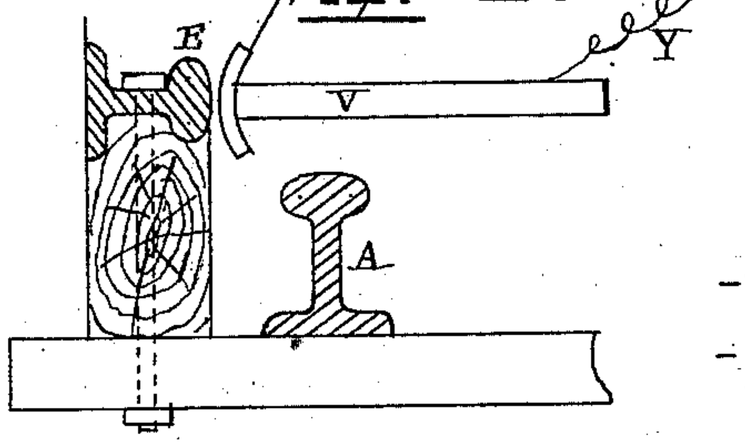


Fig. 4.

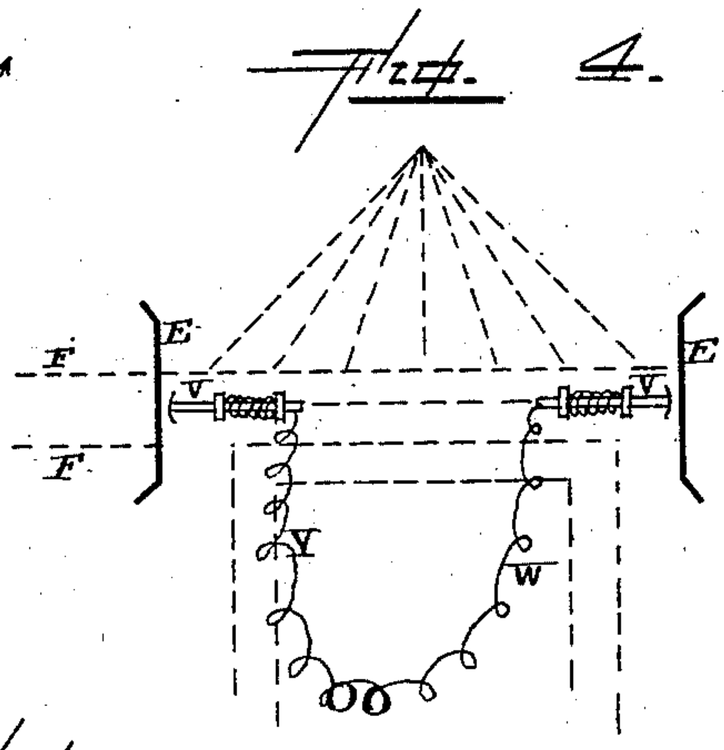


Fig. 5.

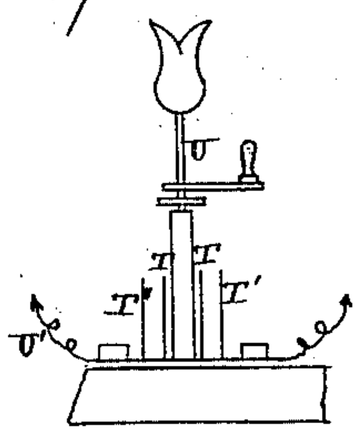


Fig. 2.

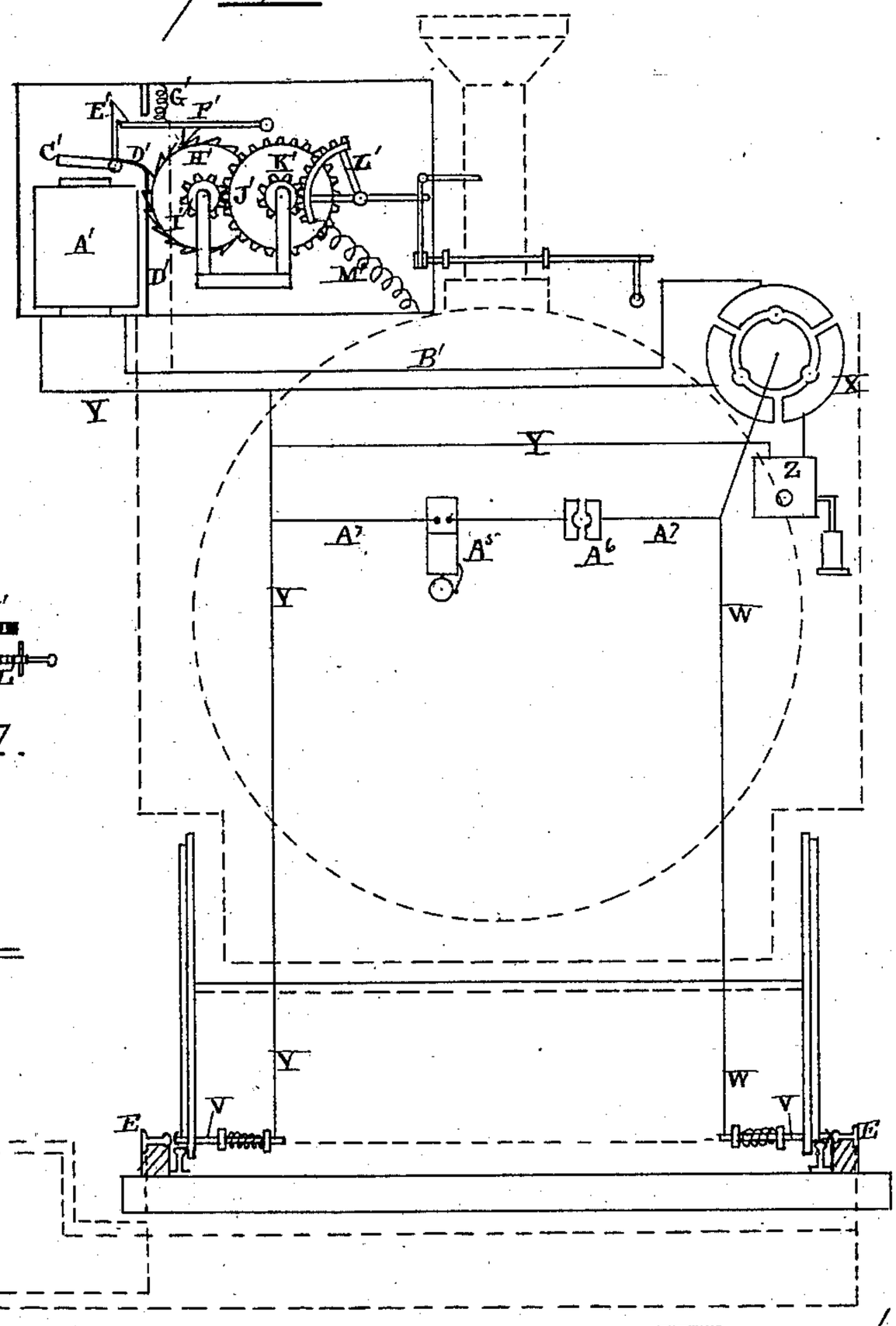


Fig. 6.

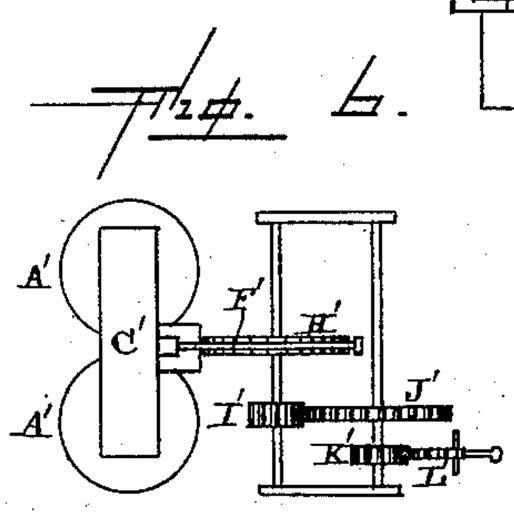
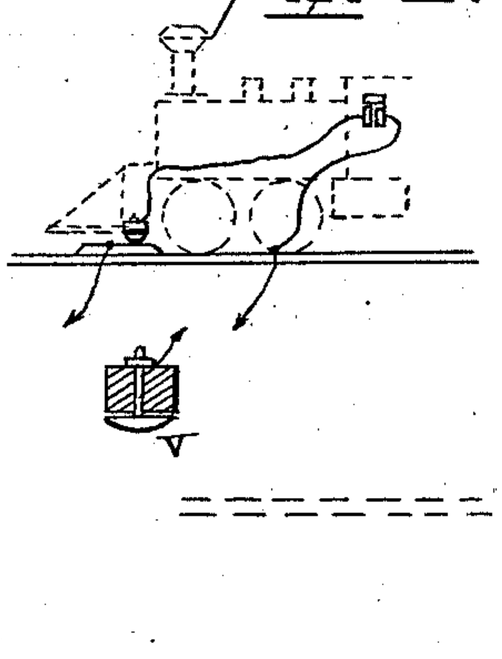


Fig. 11.



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(No Model.) 3 Sheets—Sheet 3.

W. VOGEL.

ELECTRIC RAILWAY SIGNAL.

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Fig. 9.

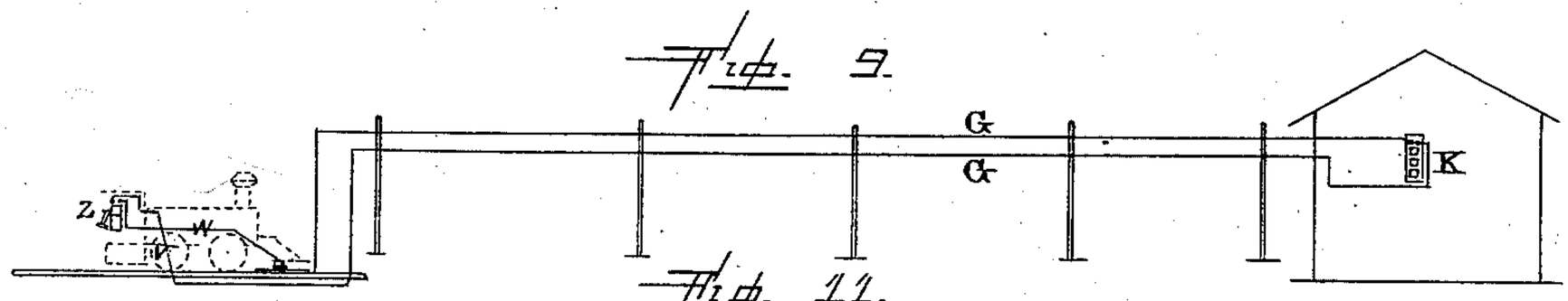


Fig. 11.

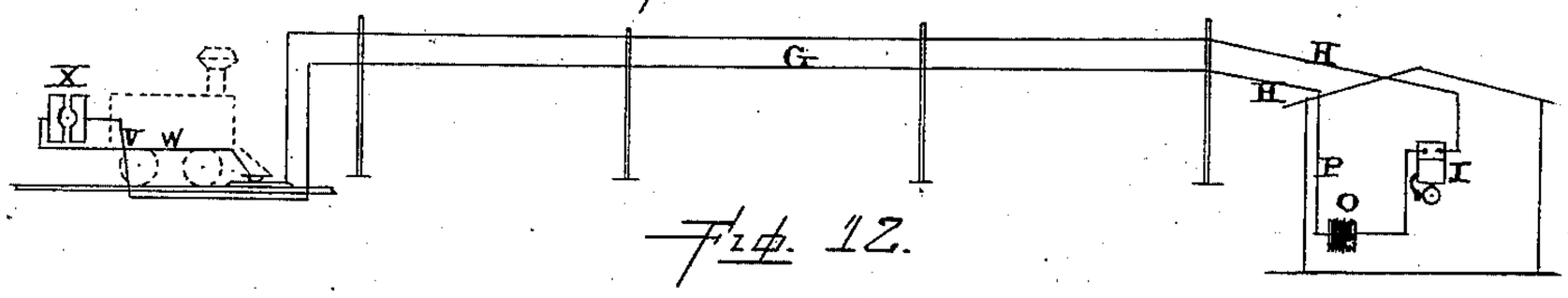


Fig. 12.

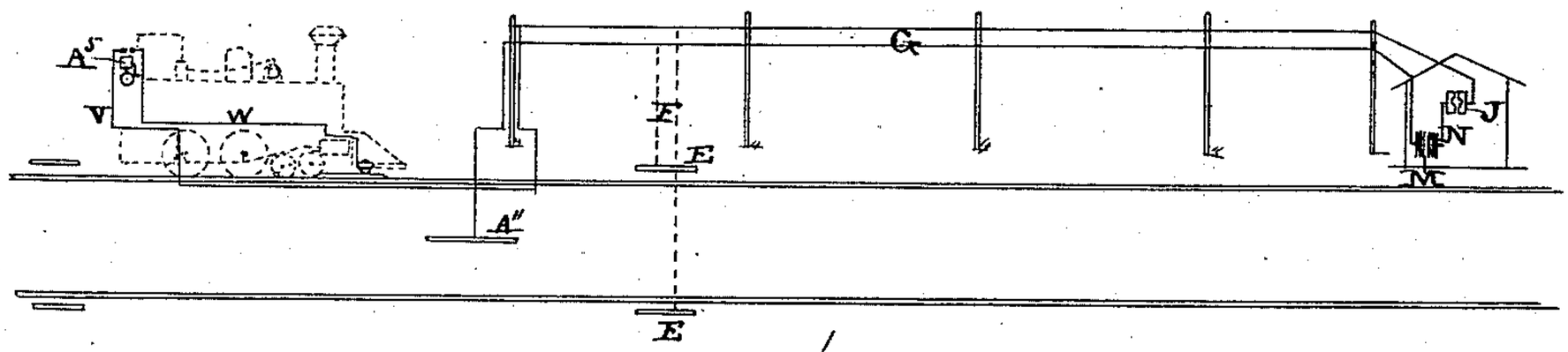


Fig. 13.

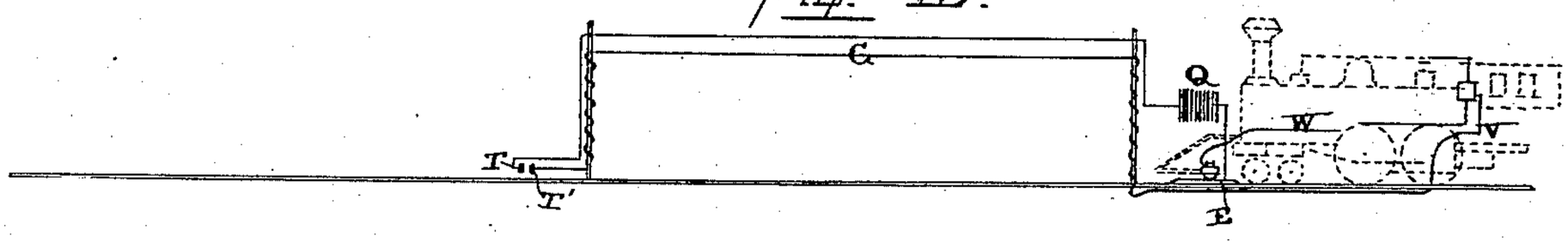
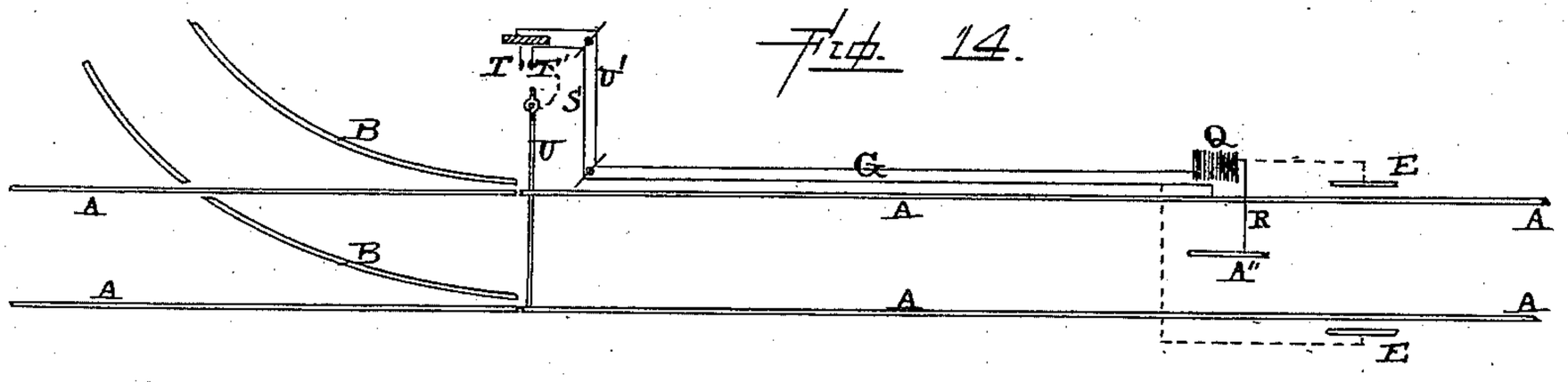


Fig. 14.



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UNITED STATES PATENT OFFICE.

WILLIAM VOGEL, OF CHICAGO, ILL., ASSIGNOR TO THE LOCOMOTIVE TELEPHONE AND ELECTRIC RAILWAY SIGNAL COMPANY, OF SAME PLACE.

ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 305,359, dated September 16, 1884.

Application filed January 25, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM VOGEL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Railway-Signals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in electric railway-signals; and it consists, first, in the combination of contacts placed along the road and connected to the battery at the station, and other contacts connected with a telephone (or other electrically-operated device at the station) and used in connection with the battery-contacts, contacts on the locomotive, an electrically-operated power mechanism and a telephone or other electrical device on the locomotive, and the wires which extend from the station and connect with the contacts along the track; second, in the combination of the strong battery, the weak battery, switches, telephone, and alarm-bell with conducting-wires, the two pair of contacts placed along the road, contacts on the locomotive, and a telephone, switch, and alarm-bell on the locomotive; third, in the combination of the electro-magnet, armature, train of wheels, and a mechanism for blowing the whistle, all of which will be more fully described hereinafter.

The object of my invention is not only to blow the whistles of all the locomotives which are approaching a misplaced switch, and thus give notice of danger, but to enable telephonic messages to be sent back and forth between two or more locomotives and between a locomotive and the station.

Figure 1 is a plan view of the track and its attachments, showing also the electric apparatus in the office or station connected with the track. Fig. 2 is a vertical cross-section showing the mechanism for operating the whistle, the telephone, the switch, and the connection with the short side rails. Figs. 3, 4, 5, and 6 are detail views. Fig. 7 shows a modification. Fig. 8 is an enlarged detail view of the switch and its connections when used in connection with its side tracks. Fig. 9 shows the telephone-circuit. Fig. 10 shows the connection with the locomotive and the short rails which are placed between the rails of the main track, as shown in Fig. 7. Fig. 11 shows the circuit between the alarm-bell on the locomotive and the station. Fig. 12 shows the circuit of the alarm-bell from the station to the locomotive, or for blowing the whistle upon the locomotive from the station. Figs. 13 and 14 are side and plan views of the switch-circuit.

A represents the main track, and B C D the side tracks, connected thereto by switches of the usual construction. Placed along the sides of both the main and side tracks are short rails or contacts E, which are raised above the level of the track-rails, so that the spring-contacts on the locomotives or cars will readily strike them as they are being passed, and thus convey the electric current to the mechanism for sounding the whistle or other alarm, and to enable telephonic messages to be sent back and forth between the station and the locomotive. Each of the short rails or contacts E is connected by a wire, F, with one of the three telegraph-wires G, which are strung along both the main and the side tracks upon poles, in the usual manner. These contacts E are arranged in pairs along both the main and side tracks, and to each pair is connected two wires G, according as the contacts are intended for blowing the whistle or sounding an alarm on the locomotive, or are intended for telephonic communication between the locomotive and the station, or between two locomotives on the track. The contacts E^5 along the side tracks, B C D, are not connected to the three wires G, but are connected to the switch-batteries by separate wires, for the reason that the whistle or other alarm on the locomotive is only to be sounded when the switch is misplaced for those trains moving along these side tracks. The three telegraph-wires G, which extend along the side track B, and also along the side tracks, C D, are each connected to a separate one of the three wires which extend along the main track, as shown. The two outside ones of the wires G are connected by

means of wires H with the alarm I, switches J, and telephone K, and the central wire by the wire L with one of the poles of the battery M, which is powerful enough for all purposes desired. Each battery M is also connected by a wire, N, at its opposite pole with the central switch, J, there being one switch for each of the wires G. One of the switches J is connected to the alarm I, and connected to each alarm-switch is a battery, O, which is just strong enough to operate the alarm, and no more. A current is only sent through this battery by the engineer of a locomotive when he wishes to communicate with the operator at the station. One pole of the weak battery is connected by the wire P with the same wire which connects with the telephone. Near or opposite each railway-switch is placed a battery, Q, one pole of which connects directly with the wire R, and the other pole is connected by means of the wire S with a movable spring-contact, T′, which is moved by the non-conducting rod U, by means of which the switch-rails are moved. The second contact, T, is connected to the wire U′. These wires R U′ connect directly with the contacts E^5 along the side tracks, so that when the switch-rails are moved so as to leave the switch open for those trains advancing along the side tracks toward it and the contact-points T T′ are forced together the whole power of the battery is turned on the side rails or contacts E^5, for the purpose of sounding the alarm on the locomotive, and thus notifying the engineer that the switch is open. This switch-rod is pivoted, when used in connection with more than one side track, so that when turned in either direction it will operate the contacts, as shown in Fig. 8. When the rod is in a line with both pair of contacts, as shown in solid lines, the switch is right for the main track, but wrong for both of the side tracks, and hence both pair of contacts are forced together, so as to turn the current on both sets of contacts E^5, ready to notify every train which passes along these side tracks, C D, toward the switch that the switch is misplaced. When the switch-rails are made to connect with either one of the side tracks, the movement of the rod forces one set of spring-contacts together, so as to send the current over the other side track and over the main track on the other side of the switch, if trains are to run in both directions along the track A. No contacts are shown on the other side of the switch on the main track beyond its junction with the side tracks, C D; but they will be placed at this point when trains are run in both directions. Should contacts be used at this point, as shown by dotted lines, a third pair of contact-points will be necessary at the switch, and the switch-rod will be provided with an arm for operating them. A non-conducting rod is used, so that it will not act as a conductor and short-circuit the current.

In connection with each railway-switch there may be two pair of contacts, so as to insure connection in case the current cannot pass through one pair; but a single pair only can be used in connection with each switch. Where there are a number of side tracks connecting with the main track, there will be a pair of contacts for each side track, so that when the switch is made to connect with one of the side tracks the current through the battery is left open for that side track, so that trains advancing along this side track will not be signaled, but the current will be closed for each of the other tracks, so as to warn trains approaching the switch from any direction along those tracks for which the switch is misplaced. Trains are only warned upon those tracks for which the switch is misplaced, and hence trains moving on those tracks for which the switch is all right pass freely through without being signaled.

Secured to each locomotive, on opposite sides, either in front of all of the wheels or between any pair of them, are the spring-contacts V, which are made to make electrical connection with the short rails E as they are being passed by the train. These contacts V are spring-actuated, so as to always insure their striking against the inner sides of the rails E under any circumstances. To the inner end of one of these contacts V is secured a wire, W, which connects with the switch X, and to the other is connected the wire Y, which connects both with the telephone Z and the electro-magnet A′. In between the two wires W Y is placed the alarm-bell A^5 and switch A^6, which bell and switch are connected to the wires W Y by the wire A^7. This magnet A′ and the switch X are also connected to the wire B′. Telephonic communication is freely had between the station and the locomotive, or between two locomotives when the locomotive or locomotives are stopped between two of the short rails E at E^2 N^2 N^3 on the main and side tracks, so that connection is made through the contacts V, but not otherwise. Certain ones of the side rails E only are connected with the telephone circuits, and of course when communication is to be had through the telephone at the station or with any telephone along the track the locomotives must stop between those side rails E which are connected with the telephone-wires.

The armature C′ is pivoted above the magnet and held in a raised position, when free to move, by means of the spring D′. Secured to this armature is a hook or catch, E′, which catches over the outer free end of the pivoted lever F′. When this lever is free to move, it is raised upward by its spring G′ for the purpose of withdrawing its detent from contact with the ratchet-wheel H′. On the shaft of this wheel H′ is a pinion, I′, which meshes with the spur-wheel J′.

On the shaft of the spur-wheel J′ is secured the pinion K′, which meshes with the toothed segment-lever L′, which has the spring M′ con-

nected to it for the purpose of drawing the lever downward when it is free to move, and thus setting the whole train of wheels in motion. The opposite end of the lever is connected to a rod, lever, or other suitable device for operating the steam-whistle of the locomotive or any other suitable mechanism for calling the engineer's attention to the fact that the switch toward which the train is moving is misplaced. The free end of this lever L′ is made to operate the whistle by pressing upward upon the whistle-lever, or it can be made to pull a wire or string to operate a steam-cock in the steam-pipe which supplies the steam to the whistle. I do not limit myself to any details of construction in this respect. By means of this power mechanism for operating the whistle the whistle is made to blow until made to stop by the engineer, and hence there is no possibility of the alarm not being heard. Where an ordinary electrical bell is used, the bell only sounds while the contacts are together, and as this is only momentary, the alarm is not apt to be heard by the engineer, owing to the great noise of the train in motion, and hence the train will not be stopped in time. This power mechanism need not be constructed exactly as here shown, for any spring-actuated mechanism which will force the whistle open and hold it so will operate equally as well; but a power mechanism which is operated electrically should be used. When the switch is in its proper position, no effect is produced on the electro-magnet A′, as the locomotive moves between those short rails E which are connected both with the battery Q at the switch and with the battery M in the station, unless the operator at the station wishes to communicate with the engineer. The whistle on the locomotive is never blown from the switch-battery Q unless the switch is misplaced for those trains which are moving along the side tracks toward the main track A, when the movement of the switch-rod U forces the contacts T and T′ together, and a current from the battery Q is turned on those wires connected with the short rails E. The circuit is completed when the locomotive passes between those short rails, and connection is at once made through the contacts V with the electro-magnet A′, and the armature is drawn downward, so as to release the spring-actuated lever F′ from the catch E′. The spring M′ starts the lever L′ into motion and sounds the whistle on the locomotive, so as to call the engineer's attention to the fact that the switch is misplaced, and that there is danger on ahead.

In case a train is advancing along the track A in the direction of the switch from the bottom of the drawings, and the operator at the station wishes to stop it, he puts his plug in the switch to the right, and thus completes the circuit between the weak battery O and the side rails E at F^5. As soon as the train reaches the side rails at F^5, a current is passed through the apparatus on the locomotive; but the current is not strong enough to operate the whistle to attract the engineer's attention. The current does, however, ring the bell I in the station, so as to let the operator know when the train reaches the point F^5. The operator then pulls the plug from the switch to the right and puts a plug in the central switch, so as to complete the circuit between the battery M and the side rails at F′. When the train reaches the point F′, the whistle is blown, so as to notify the engineer to stop at F^6, as the operator wishes to communicate with him. When the whistle is blown, the engineer takes his plug out of the hole in the switch that connects with the whistle-circuit and puts it in a hole in the switch which connects with the telephone. When the locomotive stops between the rails E at F^6, the engineer communicates with the operator through the telephone. Telephonic communication can be freely had between the locomotive and the station at the points E^2 on the side tracks and F^5 F^6 F^7 F^8 on the main track. When two locomotives are on the main track between the side rails at F^7 and F^6, or F^7 and F^5, or F^5 and F^6, or the side rails E^2 on side track B, and F^7, or F^6, or F^5, or at F^8 on the main track and E^2 on either one of the side tracks C D″, the engineers can telephone freely back and forth between the locomotives. When no plugs are placed in any of the three switches J at the station, no communication can be had between the engineers upon the locomotives and the stations, because the circuits are all cut out.

In Fig. 7 is shown a modification. Instead of the two side rails, E, there may be one short piece, A″, placed between the rails of the main track, and just opposite this piece A″ is the short piece B″ of the main track, which may or may not be disconnected from the other parts of the main track. There is no necessity for making the parts B″ separate from the main track, as the unbroken track answers just as well. Both of these parts A″ and B″ are connected by means of the wires C″ with the telegraph-wires D″, which connect with the telephone F″ and battery G″ in the station. In suitable relation to the battery G″ and the wires D″ is placed a switch, H″, by means of which the whistle can be blown from the station. The telephone F″ is connected to one of the wires D″, and by a third wire, I″, with the short pieces A″, which are placed between the tracks. In connection with this wire I″ will be used a suitable switch, J″, for the purpose of cutting out the telephone when the whistle is to be blown. When the locomotive is stopped, so that the contact V bears against the short piece A″, the current passes from the short pieces of track B″ through the wheels and over the frame of the telephone, and then down through the piece A″ back to the station, forming a complete telephone-circuit. When the rails A″ are used, a different form of contact, V, is necessary, as shown in

Fig. 10, but with this exception the operation of the circuits are just the same.

In Fig. 9 is shown the telephone-circuit between the locomotive and the station, or between two locomotives. The locomotive is of course standing between or at the short rails, which are connected with the telephone-circuit. When a telephone-circuit is to be established between the locomotive and the station, the operator at the station places his plug in the left-hand switch J. When a telephone-circuit is to be established between two locomotives, the engineers must place their plugs in the proper holes in the switch X. In Fig. 11 is shown the circuit between the switch on the locomotive and the alarm-bell in the station.

In Fig. 12 is shown the circuit between the alarm-bell, or the apparatus for blowing the whistle, and the station, both the side rails E and the central rail, A″, being shown.

Figs. 13 and 14 show the switch-circuits. When the switch is misplaced, and the contacts T and T′ are forced together, a circuit is passed from one pole of the battery Q through the wire S, the contacts T and T′, wire U′, central wire, G, wire F, to one of the side rails E, up through the locomotive, through the wire Y, and the apparatus which blows the whistle, back through the wire B′, the switch X, wire W, the contact upon the locomotive, and the short rail E, to the wire F and the wires G R, to the other pole of the battery. The circuits from each station are entirely separate and distinct, so as not to interfere with each other, as shown in Fig. 1. From either station the operator can signal every train approaching the switch upon the side tracks, and upon the main track beyond the switch, provided a third set of contacts is used and connected to the wires G, as shown, along the main track in Fig. 1.

Having thus described my invention, I claim—

1. The combination of a contact or contacts placed along the track, connecting-wires, switch-battery, and switch, with other contacts, which are also placed along the track and connected to a telephone or other electrically-operated signaling device at the station, contacts on the locomotive, an electrically-operated mechanism for blowing the whistle or sounding an alarm, and a second electrically-operated device for sending or receiving messages or signals to or from the station, substantially as shown.

2. The combination of a contact or contacts placed along the track and connected to the battery in the station, contacts on the locomotive, an electrically-operated mechanism for sounding an alarm or blowing the whistle, and a second electrically-operated signaling device, with a second contact or pair of contacts also placed along the track and connected to the telephones or other electrically-operated devices, both at the station and on the locomotive, substantially as described.

3. The combination of the strong battery M, weak battery O, switches, telephone or other electrically-operated signaling device with conducting-wires G, two contacts or sets of contacts placed along the road, contacts on the locomotive, and suitable electrically-operated mechanisms on the locomotive, substantially as set forth.

4. The combination of the locomotive, contacts on the locomotive, contacts on the road, wires, and suitable batteries with the electro-magnet A′, armature C′, provided with hook E′, a train of wheels, and a spring-actuated lever which is connected to the whistle or other alarm, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM VOGEL.

Witnesses:

F. A. LEHMANN,

A. S. PATTISON.