(No Model.) 3 Sheets—Sheet 1.

W. DAVES.

AUTOMATIC ELECTRIC RAILWAY SIGNAL.

No. 540,642. Patented June 11, 1895.

Fig. 1.

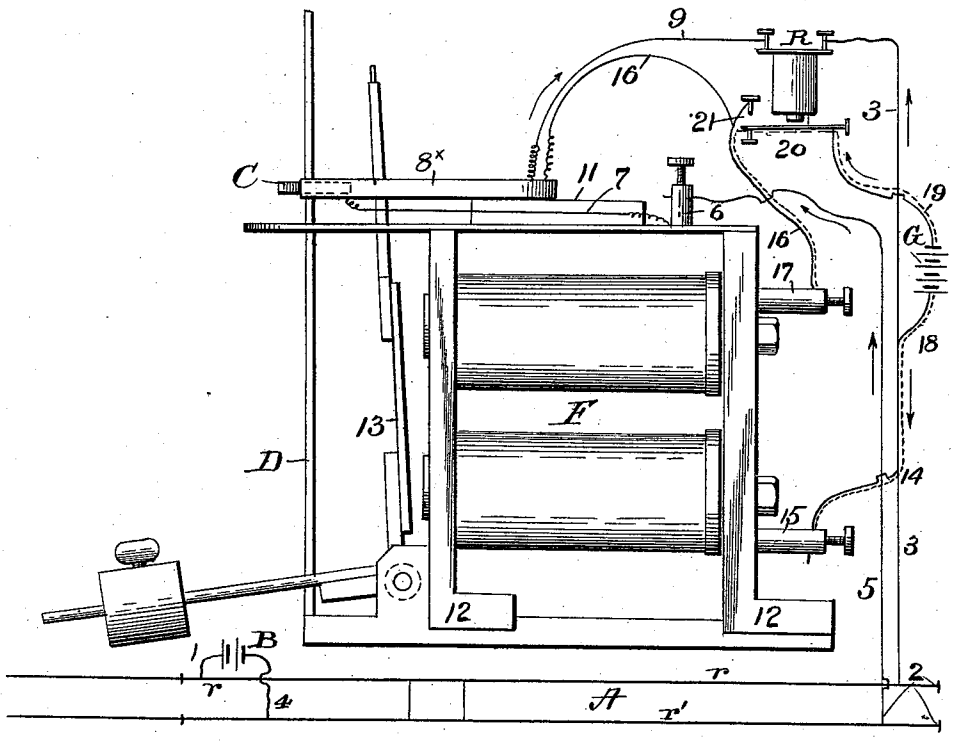
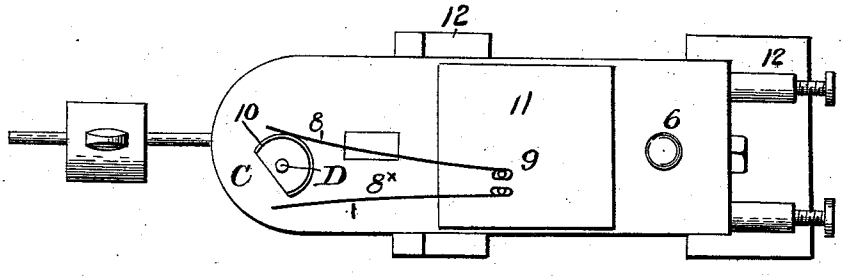


Fig. 2.



WITNESSES

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Fig. 3

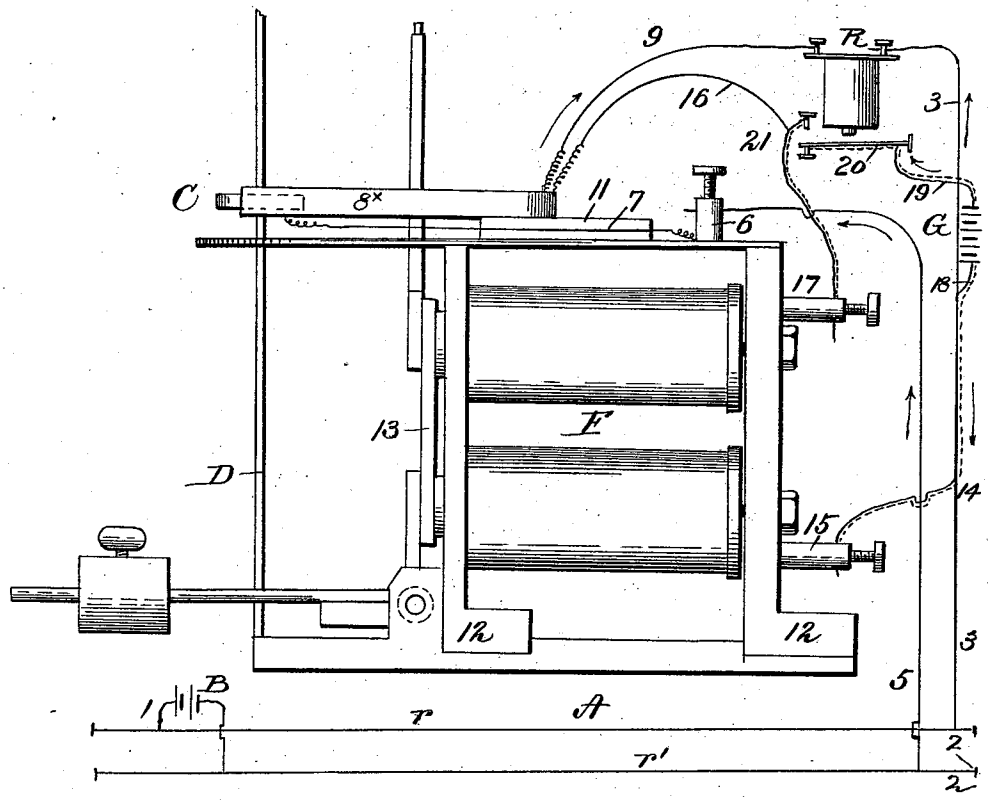
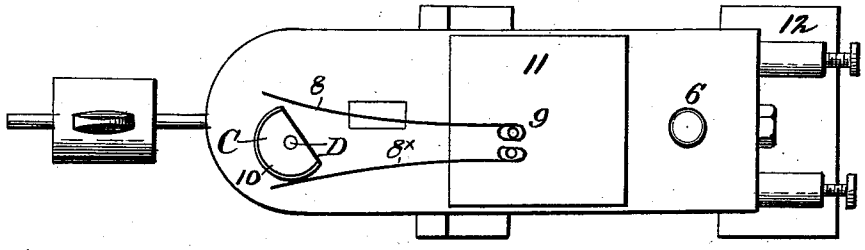


Fig. 4



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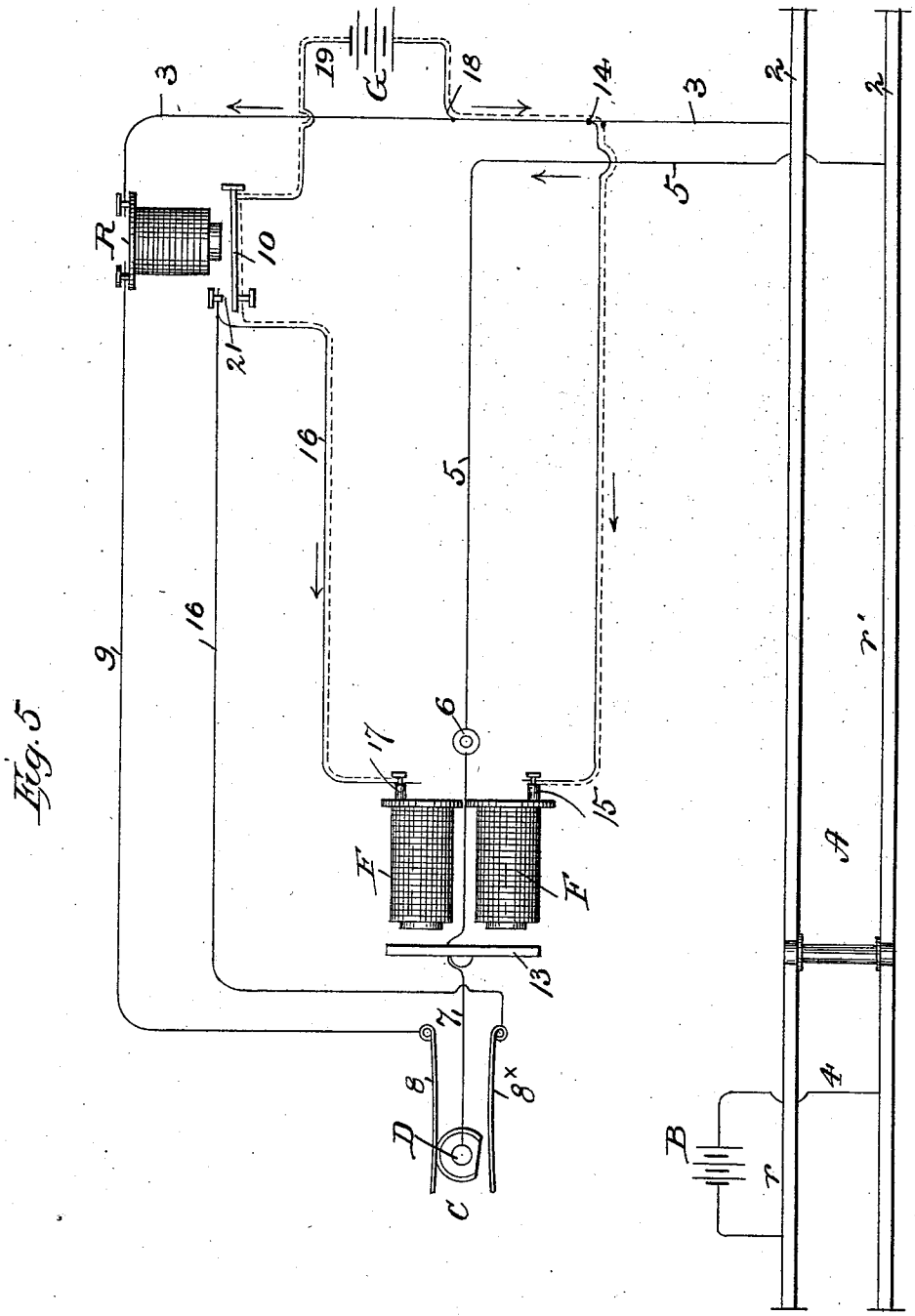

Fig. 5

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UNITED STATES PATENT OFFICE.

WILLIAM DAVES, OF JERSEY CITY, ASSIGNOR OF ONE-HALF TO WILLIAM H. PEDDLE, OF ROSELLE, NEW JERSEY.

AUTOMATIC ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 540,642, dated June 11, 1895.

Application filed February 14, 1895. Serial No. 538,317. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM DAVES, a citizen of the United States of America, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Automatic Electric Railway-Signals; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention has relation to improvements in automatic electrical railway signals, and the object is to make a system of electric circuits whereby the electric force excited on the signal magnet or instrument for operating the signal, may be alternately or successively affected by a track battery and by a main signal moving or operating battery, as will be hereinafter specified.

In the accompanying drawings, Figure 1 is a side elevation of a signal apparatus having my effective and improved system of circuits associated therewith and in which the circuits are all shown in the open condition assumed when the signal has been thrown to the position of danger by a train on the insulated track-section and the track-battery and signal-magnets cut out of the circuit. In this figure the rotative commutator is shown in the position assumed when the signal is at danger position and the signal-magnets free from any electrical influence. Fig. 2 is a plan view showing the commutator's position when the apparatus is at danger position. Fig. 3 shows the apparatus at safety, and Fig. 4 shows the position the commutator assumes when the signal is at safety. Fig. 5 is a diagrammatic view of the arrangement of the circuits.

Referring to the drawings to distinguish the several parts, A designates a section of rails of a railroad track.

B designates what is usually styled or denominated the track-battery, disposed adjacent to the track, and having its copper or positive pole connected to the rail by wire leading to one of the rails, as *r*, thence along or by the rail to near the insulated end of the section, as 2, and thence by line wire 3, to the pole of the relay R. The zinc or minus side of the relay circuit is from the track battery B, by the wire 4, the rail *r'*, thence by rail to the end of the insulated section 2, of track, thence by wire 5, to binding post 6, thence by wire 7 to the commutator C, and from thence by the brush or spring 8 and from the brush by wire 9 to the relay R. This completes the relay circuit.

D designates the signal staff suitably mounted and supported to rotate in bearings (not shown) and on the signal is fixed the hard rubber commutator C having a section of the body cut off, substantially as shown, so that when turned to its limits of movements in either direction of danger or safety, the sectional portion will stand free from contact with one or the other of the brushes, and thus break the circuit in which that brush forms a part. Adjacent to the sectional portion of the commutator the circular portion of the commutator is faced with a suitable conducting material 10, preferably of German-silver, or other non-corrosive conducting substance. The brushes 8 $8^{\times}$, are metallic springs mounted on a non-conducting plate or support 11, and applied to bear with their ends on the circular conducting edge of the commutator.

The signal magnet F or electrical instrument for holding the signal at safety is mounted in a suitable frame 12, substantially as shown and is provided with an armature 13, arranged to contact the cores of the magnet. The upper end of the armature may have any suitable mechanical connection to the signal staff for rotating the signal, such as a crank or rack and pinion. I have not shown any mechanism as any proper means may be used for the purpose.

The circuit for holding the armature in contact with the signal magnet is as follows: From track battery B by the wire 1, thence by rail *r*, to insulation 2, thence to a point, as 14, in wire 3, and from thence to a binding post 15, of the signal magnet. The other line or zinc side of the signal magnet circuit is from the track-battery B by wire 4 to rail *r'*, thence adjacent to insulation 2, thence by

wire 5, to binding post 6, thence by wire 7, to commutator C, thence by the brush $8^{\times}$ and by wire 16 to binding post 17, of the signal magnet. This completes the circuit of the track-battery utilized for holding the armature in contact with the signal magnet and the signal to position of safety.

In Fig. 1 of the drawings, the apparatus is in position assumed when the signal stands at danger, and the signal magnet circuit in connection with the track-battery broken, because of the presence of the train on the section, and the brush being thus thrown out of contact with the commutator, by the rotation thereof into position shown in Fig. 2 of the drawings. The relay circuit is also broken by the presence of the train upon the track section. When the train passes out of the section, the relay circuit is restored, but not the signal magnet circuit, which remains open. It therefore becomes necessary to employ another circuit to energize the signal magnet, to draw back the armature and return the signal to safety, and the circuit I provide as follows: In any suitable position a signal battery G, is placed and its copper or positive pole connected to the wire 18, leading to the wire 3 of the track battery relay circuit, and to the binding post 15 of the signal magnet. The other side or line of the signal battery is by wire 19 to contact-piece 20, of relay R, and from contact points 21, by wire 16 to binding post 17. In the drawings the signal-magnet circuit is designated generally, by dotted lines closely adjacent to the wires over which it passes.

It will be perceived by tracing the respective circuits, that the brush $8^{\times}$ does not contact with the commutator when the signal has been thrown to danger position; and that the track-battery circuit which controls the relay is transferred from the relay to the signal-magnet, or an equivalent electrical instrument adapted to operate and control the signal, by means of the commutator which transfers the relay circuit from the zinc pole of the track battery to brush $8^{\times}$, then to the signal magnet to hold the signal in safety position, and in this condition of mechanism and circuit the relay remains open with the contact piece free from contact with the pole of the relay; and when a train enters the block or insulated section of rails it cuts out the signal magnet, but does not affect the relay, as that is already out of circuit, and is idle both when the signal is at danger and at safety; and is only closed when the train passes off the section and during the very few moments while the signal is passing from danger to safety. This is accomplished by means of the brushes 8, $8^{\times}$, simultaneously having contact with the commutator. When the train has passed from the section or block the relay circuit through the commutator and brush is restored from the track battery and the relay energized to close its contact-piece, which action closes the circuit of the signal battery with the signal magnet, drawing up the signal controlling armature into contact, rotating the signal and breaking contact between the commutator and brush 8, breaking the relay circuits and reforming the track-battery circuit through the brush $8^{\times}$ to signal magnet; breaking the signal battery circuit and leaving the track-battery to hold the signal at safety. The brushes 8 and $8^{\times}$ both make contact with the commutator at the time the signal is turning from danger to safety, but brush 8 will break contact with the commutator when the limit of rotation is reached and thus disengage the relay, and break the signal-magnet circuit, and the track-battery will, as above specified, be transferred from the relay to the signal magnet. As indicated both brushes are in contact with the commutator during the short time while the signal is passing from danger to safety, a condition which does not interfere with the working of either battery, it being necessary that when the relay contact closes, that brush $8^{\times}$ make contact with the commutator before the relay circuit is broken. The signal battery does not remain in service except while the signal passes from danger to safety and the commutator is in motion.

What I claim, and desire to secure by Letters Patent, is—

1. In an automatic electric railway signaling apparatus, the combination with the rotative signal staff and a commutator, of a track-circuit, a signal controlling magnet in the track circuit adapted to be cut out of circuit by the presence of a train on the track-section, a relay interposed in the track-circuit and adapted to stand open and cut out therefrom when the track-circuit is employed to charge the signal magnet and to be closed when the train has passed from the track section, and a signal operating battery circuit having a signal magnet interposed therein and completed by having one of its lines through the contact piece of the relay to the signal magnets, whereby when the train has passed from the track section the track-battery will energize the relay, and the signal battery will energize the signal magnet to operate the signal mechanism, after which the relay and signal and signal battery circuits are broken and the signal held at safety by the track circuit, as set forth.

2. In an automatic electric railway signaling apparatus, the combination of a track battery B, the track circuit leading therefrom comprising the wires 1, 4, insulated track sections r, r', line wires 3, 5, 7, commutator C, brush 8, and wire 9; a relay R interposed in the circuit and adapted to stand out of circuit through the agency of the commutator when the signal is at safety; the signal battery G having circuit with the signal magnet controlling the signal mechanism, through circuit wires 18, 3, 19, contact piece 20, and wire

16; and the signal circuit from the track battery by wires 3, to binding post of signal magnet and from track battery by wire 5, to binding post 6, wire 7, to commutator C, by brush $8^{\times}$ and wire 16, to binding post 17 of signal magnet, all arranged and combined to operate substantially as and for the purpose specified.

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

WILLIAM DAVES.

Witnesses:
A. L. PITTINGER,
WM. COLGAN.