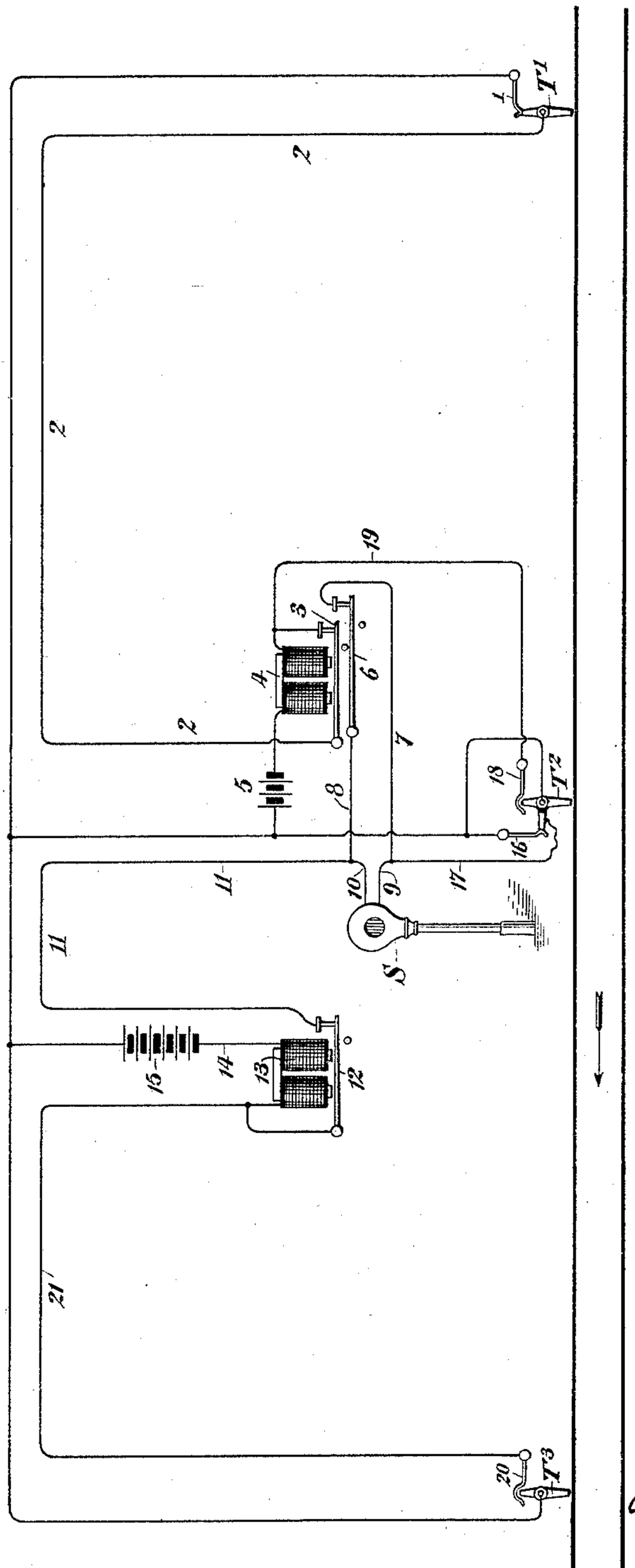
(No Model.)

A. J. WILSON.

ELECTRIC RAILWAY SIGNAL.

No. 485,728. Patented Nov. 8, 1892.



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UNITED STATES PATENT OFFICE.

ADONIRAM J. WILSON, OF PORT CHESTER, NEW YORK, ASSIGNOR TO THE HALL SIGNAL COMPANY, OF MAINE.

ELECTRIC RAILWAY-SIGNAL.

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To all whom it may concern:

Be it known that I, ADONIRAM J. WILSON, a citizen of the United States, residing at Port Chester, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Electric Railway-Signals, which improvement is fully set forth in the following specification and the accompanying drawing, which forms a part hereof.

The present invention relates to automatic electric block signals for railways; and it has for its object to improve and simplify the operation of such systems, to reduce the number of unnecessary stops occasioned thereby while maintaining with certainty the giving of warning on every occasion of danger, and to reduce the expense of plant and of operation; and it consists in the devices herein shown and claimed.

The accompanying drawing represents diagrammatically the invention as applied in its simplest and preferred form to a single signal guarding a given section of track, which guarded section may be one block of the line or one block and an overlap on or portion of the next succeeding block, or may be two blocks or any other length of track desired. The preceding and succeeding signals on the line are controlled by similar and duplicate devices. The arrangement of devices will be best explained by describing in order, in connection with the drawing, the successive operations of a train upon those devices in passing over the part of the line involved. The train is supposed to be moving in the direction indicated by the arrow.

T′, T^2, and T^3 are track-instruments of any suitable construction and suitably placed along the line of track, T^2 being placed at the beginning of the guarded section of track, and T^3 at the end thereof, and T′ being placed at any desired distance in front of the signal S, which signal guards the section of track T^2 T^3.

First operation, on train striking track-instrument T′: This opens the closed contact-spring 1, which breaks the local circuit made by spring 1, wire 2, point or armature 3 of relay 4, coil of relay 4, battery 5, and common battery-wire to spring 1 again. This demagnetizes relay 4, which drops its point or armature, thereby making a permanent break in the local circuit described. The demagnetizing of relay 4 (thus accomplished and thus made permanent) also causes its point or armature 6 to drop or spring away, thus breaking between point 6 and wire 7 the shunt or branch (made by wire 8, point 6, and wire 7) around the signal S and its immediately-operating magnet. This shunt or branch is of low resistance relatively to that of the magnet immediately operating the signal, so that when closed it carries substantially all the current of the main signaling-circuit. The breaking of the shunt or branch causes the current of the main signaling-circuit to pass through the signal-magnet, which then moves the signal to "Clear." This main signaling-circuit is normally closed and is made by the signal-magnet S and wires 9 and 10, (which are normally cut off from current by the shunt or branch 8 6 7, as stated,) wire 11, point or armature 12 of relay 13, coil of relay 13, wire 14, battery 15, common battery-wire to closed spring or circuit-breaker 16 (in track-instrument T^2) and wire 17. So long as there is current flowing in this main signaling-circuit the demagnetizing of relay 4 and consequent breaking of the shunt or branch around the signal-magnet sends the main signaling-current through that magnet and sets the signal at "Clear." Seeing this the engineer of the train proceeds.

Second operation, on train striking track-instrument T^2: This breaks contact at the closed spring or circuit-breaker 16 and makes contact at the open spring or circuit-closer 18. The break at 16 is a break in the main signaling-circuit above described. It demagnetizes the signal-magnet (sending the signal to "Danger") and also the magnet or relay 13. The latter operation causes the point or armature 12 of relay 13 to drop or spring away, thereby producing between 12 and 11 a permanent break in the main signaling-circuit and so maintaining the signal permanently at "Danger." The closing of the open spring or circuit-closer 18 makes the following circuit: 18, wire 19, coil of relay 4, battery 5, and back to 18. This magnetizes relay 4 and draws up the two points 3 and 6 of that

relay. The drawing up of point 3 to the magnet restores to its original closed condition the local circuit first above described of battery 5, relay 4, and closed spring or circuit-breaker 1, and the drawing up of point 6 to the magnet restores to its original closed condition the shunt or branch circuit 8 6 7 around the signal. Spring 18 need not necessarily be in the same track-instrument as spring 16, and the distance between springs 1 and 18 need only be sufficient to enable the engineer to observe that the signal S clears when the train strikes spring 1, or to stop his train if it does not clear. This clearing of the signal indicates to the engineer that there is no train on the guarded section of track T^2 T^3. The spring 18 may be on either side of 16—that is, may be operated by the train before or after 16—and it may even be so far on as T^3, although that is unnecessary.

Third operation, on train striking track-instrument T^3: This closes the open spring or circuit-closer 20, which completes the circuit made by 20, wire 21, coil of relay 13, wire 14, battery 15, and back by common battery-wire to spring 20. The magnetizing of relay 13 draws up its point or armature 12, thereby remaking the permanent break in the main signaling-circuit between 12 and 11 and restoring that circuit to its original and normal closed condition.

Fourth operation, on a second train striking T′ while the first train is still on the guarded section of track T^2 T^3: This demagnetizes 4, as before, and breaks the shunt or branch circuit of the main signaling-circuit; but as that main signaling-circuit is permanently broken at point 12 no current is flowing in any part of it, and so the breaking of the shunt or branch does not operate to clear the signal, but, on the contrary, the signal remains at "danger." Seeing this, the engineer of the second train brings his train to a stop at some point on the track between springs 1 and 18. When now the first train finally strikes track-instrument T^3, it will, as before, close the permanent break at 12 in the main signaling-circuit, and the current of the battery 15, immediately flowing therein, will pass through the signal-magnet, as the shunt or branch around it is now broken at 6, and will clear the signal. On seeing this the engineer of the second train will know that the first train has reached the end of the guarded section T^2 T^3 and will proceed.

It will be observed that after a train has operated the closed circuit-breaker or spring 16 the signal S cannot clear before any other following train that operates the closed spring 1 until the first train operates the open circuit-closer or spring 20. It will further be observed that then the signal S will clear, no matter at what point along the track between springs 1 and 18 the second train is standing or moving, provided only the second train has not overrun the point at which the spring 18 is placed. For this reason it is preferable not to place the spring 18 much, if any, in advance of the signal S itself—that is, nearer to spring 1. It will also be observed that the signal is normally at "danger," and that nevertheless the main signaling-circuit is a normally-closed circuit and the current a normally and steadily going current, so to speak. It will also be observed that the clearing of the sgnal is accomplished, not by the starting afresh of a current from a battery that is not normally in operation, but by the shunting of a normally steady and going current from one path (8 6 7) to another path, (10 S 9.) Certain advantages result from this circumstance, among them increased regularity of operation and facility of oversight and reduced liability to unnecessary stops. It will also be observed that in the preferred form of the invention the moving train operates upon the normally-closed signaling-circuit through the intermediation of track-instruments—that is, operates the circuit-breakers in that signaling-circuit by a momentary mechanical action at a given point upon a spring—thus avoiding the expense and uncertainties of rail-circuits, although this feature is not essential to the invention of the first claim. It will also be observed that in the preferred form of the invention the local circuit intermediate in its position and operation between the track-instrument T′ and the shunt or branch 8 6 7 around the signal is a normally-closed circuit, this reducing the liability to unnecessary stops; but this feature is essential only to the invention of the third claim, as for the purposes of the first and second claims a normally-open local circuit could be employed.

It will be understood that the visible signals S may be replaced by audible signals or by both audible and visible signals without departing from my invention; also that the said signals may be replaced by electric locks or interlocking devices, as parts of a larger system, without departing from my invention; also that said signals may be operated either directly by the current flowing in the signaling-circuit of the invention or indirectly by that current—as, for instance, the signals may be directly operated by steam or by pneumatic power, or by the current of a dynamo or a storage-battery or other source of current, or by other power and said power be directed and controlled by the current flowing in the circuits of the invention, without departing from my invention. It will also be understood that my invention may be employed in conjunction and connection with other systems and devices and inventions not inconsistent therewith. It will also be understood that the particular construction of the relays, the track-instruments, the signals and their immediately-operating mechanism, and other details shown may be greatly varied without departing from my invention.

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

1. In a block-signaling apparatus, a normally-closed signaling-circuit including in the main part thereof a normally-closed circuit-breaker constructed to be opened by the action of the train on the section of track that is guarded by the signal and also including a normally-closed branch or shunt of low resistance around the signaling-magnet, and in said branch or shunt a normally-closed circuit-breaker constructed to be opened by the action of the train on the section of track preceding the guarded section, substantially as and for the purposes set forth.

2. In a block-signaling apparatus, the combination of a normally-closed main signaling-circuit constructed to be broken by the action of the train upon a track-instrument placed at the beginning of the guarded section and to be closed again by the action of the train upon a track-instrument placed at the end of the guarded section and including a normally-closed branch or shunt of low resistance around the signal with a local circuit constructed to break said branch or shunt by the action of the train upon a track-instrument placed at a point suitably preceding the guarded section and to close again said branch or shunt by the action of the train upon a track-instrument placed upon or near the guarded section, substantially as and for the purposes set forth.

3. In a block-signaling apparatus, the combination of a normally-closed main signaling-circuit constructed to be broken by the action of the train upon a track-instrument placed at the beginning of the guarded section and to be closed again by the action of the train upon a track-instrument placed at the end of the guarded section and including a normally-closed branch or shunt of low resistance around the signal with a normally-closed local circuit constructed to be broken (and thereby to break said branch or shunt) by the action of the train upon a track-instrument placed at a point suitably preceding the guarded section and to be closed (and thereby to close again said branch or shunt) by the action of the train upon a track-instrument placed upon or near the guarded section, substantially as and for the purposes set forth.

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