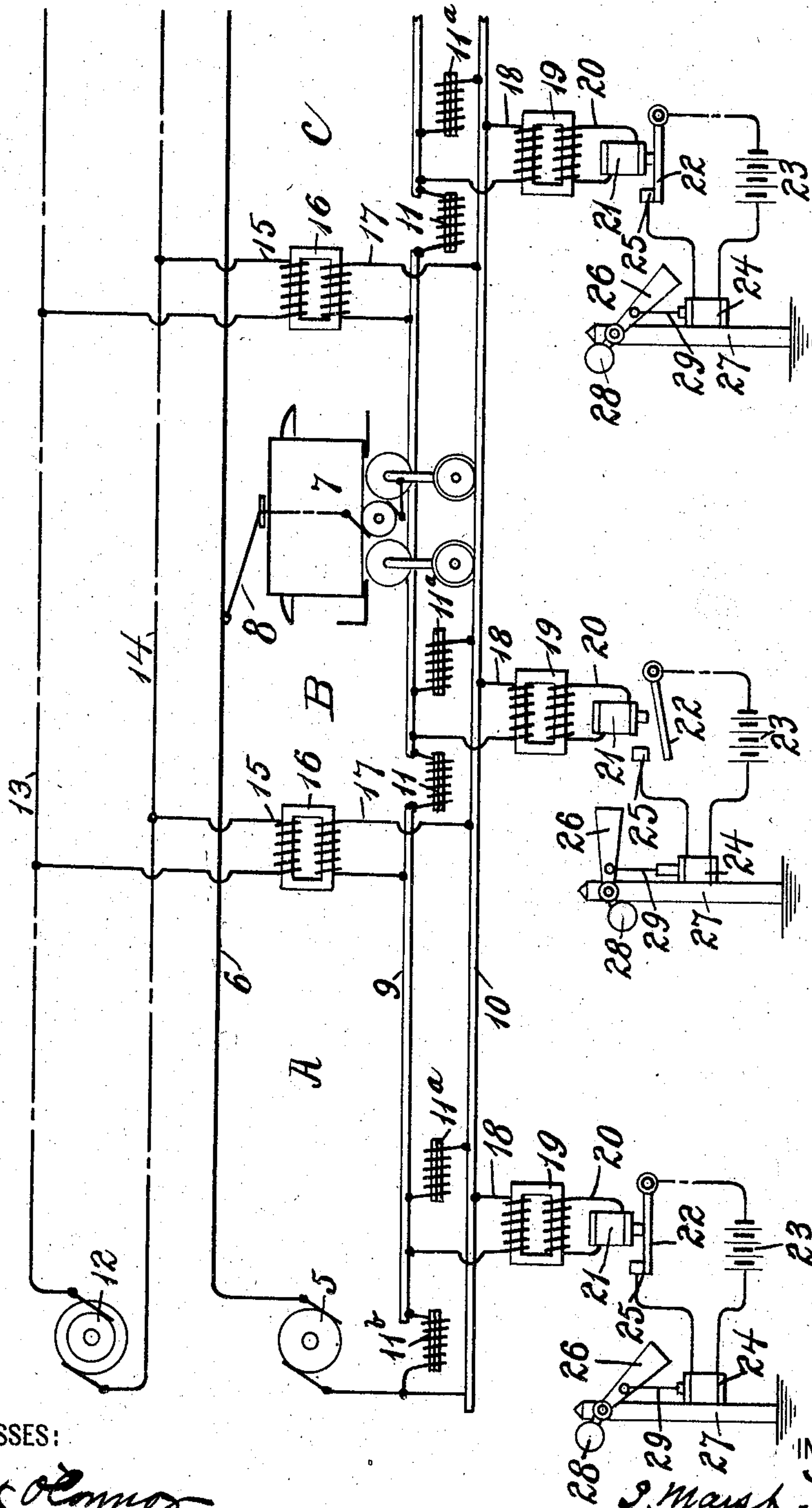


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S. M. YOUNG.
ELECTRIC SIGNALING SYSTEM.
APPLICATION FILED OCT. 18, 1904.



WITNESSES:

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ELECTRIC SIGNALING SYSTEM.

No. 815,891.

Specification of Letters Patent.

Patented March 20, 1906.

Original application filed April 25, 1903, Serial No. 154,275. Divided and this application filed October 18, 1904. Serial No. 228,954.

To all whom it may concern:

Be it known that I, SAMUEL MARSH YOUNG, a citizen of the United States, residing at New York city, county and State of New York, have invented a System of Automatic Signaling for Electric Railways, of which the following is a specification.

My invention consists in a system of automatic signaling for electric railways.

The object of my invention is to provide means whereby the condition of any section of a railway may be visibly, audibly, or otherwise indicated—as, for instance, through the operation of semaphore-arms, bells, lights, &c.

It has heretofore been proposed to divide an electric railway into a series of blocks and to locate in each of such blocks a signaling device normally held in the "clear" position by means of a magnet traversed by a current derived from a battery, from the secondary of a transformer having its primary in circuit with a source of current energy, or from any suitable source of electrical energy and such signaling devices adapted to be moved to the "danger" position when a car moves into a block by the car shunting the current from the source of signaling energy around the signaling device and the signaling device subjected to the lifting action of a counterweight. Such system of signals is applicable to railways where the motive power is steam or other source of energy carried on the car-motors, but is not applicable to railways where the motive power is electricity transmitted wholly or in part through the rails of the railway and for the reason that the currents employed in operating the car-motors and signals must be kept distinct. For instance, in a railway operated by direct-current energy it is necessary that the signals be operated by alternating or pulsating current energy, and in the case where the car-motors are operated by alternating-current energy that the signals also be operated by alternating-current energy, but that the two currents be of different frequency or phase relation.

In the case where the car-motors are operated by direct current manifestly it is necessary to interpose devices in the system for preventing the direct current from influencing the devices adapted to be actuated by the alternating current, and vice versa. In United States Letters Patent granted to me—

to wit, Nos. 757,537 and 762,370, dated, respectively, April 19, 1904, and June 14, 1904—I have illustrated the character and the use of such devices and have also shown an arrangement of circuits whereby the direct and alternating currents employed make use of a common return.

I will describe my invention as applied to a system employing a direct current for operating the car-motors and an alternating current for actuating the signaling devices, which system is intended as a modification of that described in my prior patents. The accompanying diagram will serve to illustrate my invention.

Referring to the diagram, 5 indicates a direct-current generator; 6, outgoing feeder from which current may be taken to the car-motor 7 through the instrumentality of trolley-poles or other contact devices 8; 9, 10, rails upon which the car-motor moves. The rail 9 is divided into a series of block-sections A B C. Rail 10 is continuous. The sections of the rail 9 are connected by reactance-bonds 11. Corresponding reactance-bonds 11^a are connected across the rails and a reactance-bond 11^b between the end of a rail-section and the dynamo 5.

The object of the reactance-bonds is to prevent the alternating signaling-current from flowing between the block-sections A B C or across the rails 9 10 or from the end section of rail 9 to dynamo 5. The advantage of using the reactance-bonds is that the resistance of the return-conductor for the power-current is thus materially reduced from what it would be if one rail were abandoned, and, further, the leakage of the alternating-current between the rails is reduced to a minimum.

To operate the signals, I employ the alternating generator 12, to which is connected the conductors 13 and 14. Connected across the conductors 13 and 14 is the primary 15 of a transformer 16, the secondary of which, 17, is connected across the rails 9 10. A transformer is located in each block. Connected across the rails 9 10 of each block is the primary 18 of a second transformer 19, the secondary 20 of which includes the coil of a relay-magnet 21. Mounted under the magnet is a pivoted armature 22.

23 indicates a source of electrical energy, which may be a battery, secondary of a trans-

former, or other source of energy. 24 is a magnet; 25, contact-point.

26 indicates a semaphore-arm mounted on standard 27. On one end of the semaphore-arm is a counterweight 28, and connected to the opposite side of the arm is a rod 29, which forms the core of the magnet 24.

The operation of my device is as follows: Upon referring to the drawing it will be seen that the car-motor occupies the center block B. The effect of the motor upon entering a block is to short-circuit the primary 18 of the transformer 19, thereby allowing the magnet 21 to drop its armature 22, and thus open the local circuit from the source of energy 23 to the magnet 24, the effect of which is to permit the counterweight 28 to lift the semaphore-arm 26 to the danger position, indicating that a car is on the block. When the car moves out of the block, the current in the secondary 20 of the transformer 19 energizes the magnet 21, which attracts its armature 22, closes the circuit from the source of energy 23 to the magnet 24, which attracts its armature 29, thus drawing the semaphore-arm 26 to the "clear" position.

I do not limit myself in any wise to a system where the car-motors are operated by a direct current and the signaling devices by an alternating current, as it will be evident to those skilled in the art that an alternating generator may be substituted for the generator 5, provided the frequency of alternations of current delivered from this generator be different from that from the generator 12. Under ordinary conditions of practice I would make the alternations of the current from the generator 5, say, one hundred and twelve per minute, while that of the current from the generator 12 twenty per minute.

It is well understood that a relay adapted to work with alternations at twenty per minute will not be influenced by a current with alternations of one hundred and twelve per minute. It will also be understood that the phases of the currents delivered from generators 5 and 12 may be different, or I may arrange the transformer 19 in such manner that different phases may be created in its secondary, which may be used to operate motors or other devices whose action will correspond so far as the signals are concerned to that of the relay-magnets 21 or otherwise.

In the claims of this application and in referring to the separate currents employed for actuating the car-motors and the signals I have used the expression "differing in character," and by this expression I wish to have it understood that there must be a difference in electrical character and entirely irrespective of the relative strength of the two currents employed—as, for instance, one current may be a direct current and the other an alternating current, or both currents may

be alternating and differing in frequency or phase relation.

This application is a division of my former application, Serial No. 154,275, filed April 25, 1903.

I wish it understood that I make no claim in this application for the broad features of an automatic block-signaling system for electric railways as herein disclosed and as heretofore disclosed in my Patent No. 757,537, dated April 19, 1904, and that the claims of this application are limited to the particular features of construction herein shown, but not shown in my former patent—i. e., a construction where the power and signaling circuits are physically separated, but in inductive relation.

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

1. A system of electrical distribution and signaling for railways, comprising two sources of electrical energy delivering currents differing in character, a system of conductors for the current from one of said sources comprising an outgoing feeder-conductor and two return-conductors, one of said last-named conductors formed from a continuous rail and the other from a divided rail and reactance-bonds, and a system of conductors for the current from the other source comprising two continuous conductors electrically insulated from the current derived from the source of energy to which they are not connected, motor-cars operated from one source of energy, and signaling devices operated from the other source of energy, and adapted to be controlled by the movement of the motor-cars.

2. A system of electrical distribution and signaling for railways, comprising two sources of electrical energy delivering currents differing in character, a system of conductors from each of said sources of energy, one of said systems of conductors electrically insulated from the current traversing the second system of conductors, and the second system of conductors having impressed upon its return-legs an alternating current, motor-cars driven from the second source of electricity, and signaling devices energized from the first source of electricity and adapted to be controlled by the movement of the motor-cars.

3. A system of electrical distribution and signaling for railways, comprising two sources of electrical energy delivering currents different in character, a system of conductors from each of said sources of energy, one of said systems of conductors electrically insulated from the current traversing the second system of conductors, and the second system of conductors having impressed upon its return-legs a current different in character from that derived from the second source of electricity, motor-cars driven from the second source of electricity and signaling devices energized

from the first source of electricity and adapted to be controlled by the movements of the motor-cars.

5 4. A system of electrical distribution and signaling for railways, comprising two sources of electrical energy delivering currents different in character, an independent system of conductors from each of said sources of energy, one of said systems of conductors comprising an outgoing feeder and two return-
10 paths, one of said return-paths formed of a continuous rail and the other of a divided rail with interposed reactance-bonds, trans-

formers having their primaries connected across one source of electrical energy and 15 their secondaries across the rails, transformers having their primaries connected across the rails and their secondaries across relay devices, and signaling devices controlled by the relays. 20

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

SAMUEL MARSH YOUNG.

Witnesses:

J. E. PEARSON,
FRANK O'CONNOR.