No. 832,548. PATENTED OCT. 2, 1906.

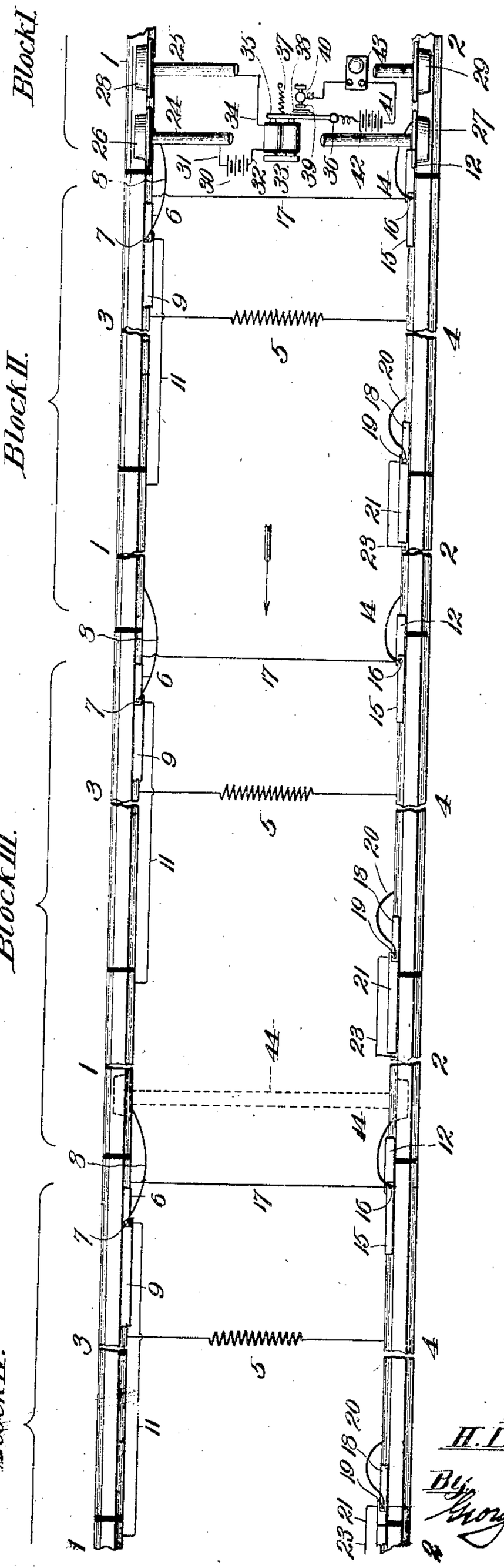
H. L. JOHNSON.

SYSTEM OF RAILWAY SIGNALING.

APPLICATION FILED APR. 29, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

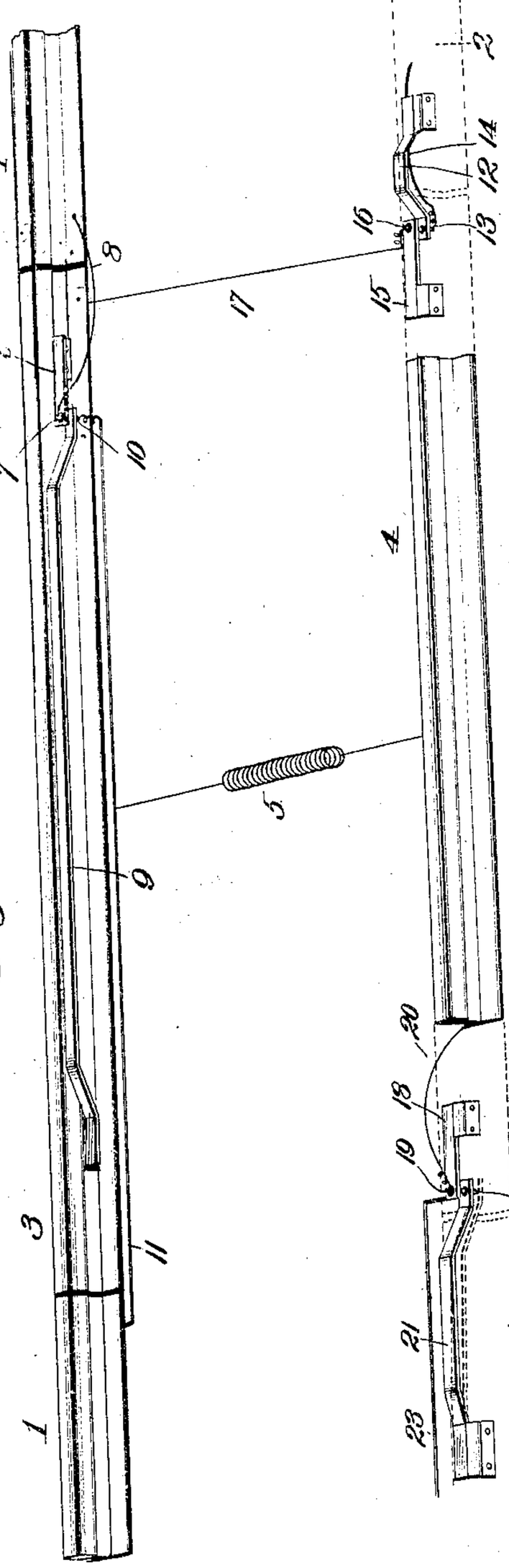


Fig. 3.

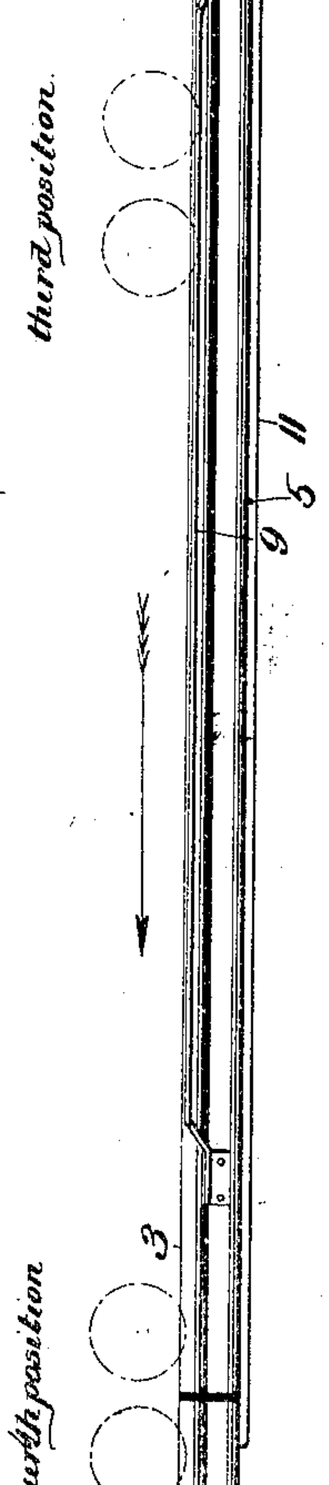
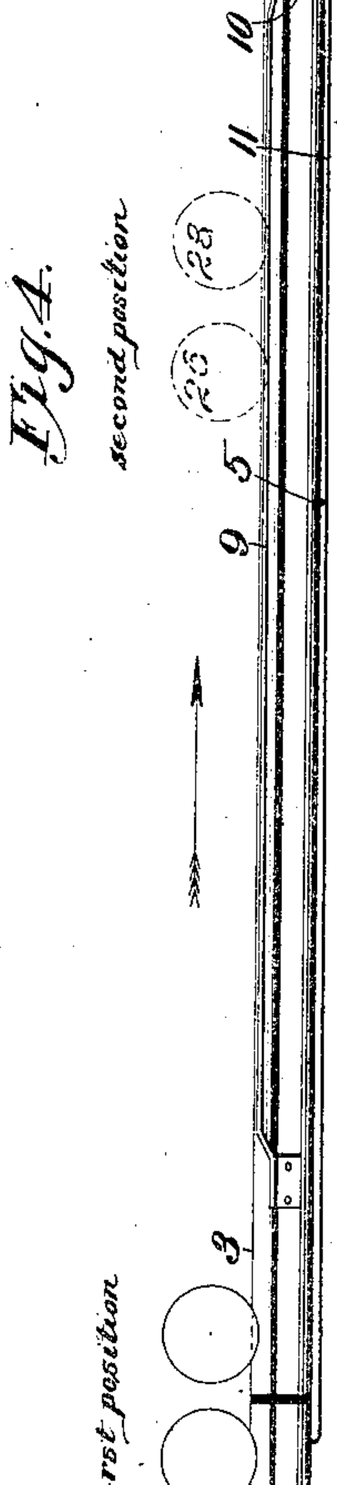


Fig. 4.



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UNITED STATES PATENT OFFICE.

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SYSTEM OF RAILWAY SIGNALING.

No. 832,548. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed April 29, 1905. Serial No. 258,133.

To all whom it may concern:

Be it known that I, HARRY L. JOHNSON, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented a new and useful System of Railway Signaling, of which the following is a specification.

This invention relates to block-signal systems for railways, and has for its object to produce an efficient and reliable apparatus for automatically signaling the engineer, motorman, or other person in charge of a train or car that it will be safe or dangerous to proceed, accordingly as a certain portion of the track or crossing-track is clear or occupied by another train or car.

With this object in view the invention consists in certain novel and peculiar features of construction and organization, as hereinafter described and claimed, and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1 is a diagrammatic plan view of a portion of a trackway embodying my invention, said figure also representing that portion of the improvement carried by the train or car. Fig. 2 is a perspective view of a portion of the trackway embodying the improvement. Fig. 3 is an inner view of one side of the trackway and represents certain positions which the car or train thereon will assume. Fig. 4 is a similar view representing certain positions of the train or car when traveling in the opposite direction to that indicated by Fig. 3.

Referring to the drawings in detail, which show a single-track railway, it will be noted that each block, marked "Block I," "Block II," "Block III," &c., consists of a long and a short section insulated from each other, the long and short sections of the outer side of the trackway being numbered 1 and 3, respectively, and the corresponding sections of the inner side of the trackway being numbered 2 and 4, respectively.

5 indicates a resistance-coil conductor connecting the short sections 3 and 4 of each block, and 6 represents spring-plates secured to the short sections 3 and provided with insulated contact-pins 7, connected by conductors 8 to the long sections 1 of their respective blocks.

9 represents arched spring-plates secured to the short sections of the outer side of the trackway and underlying the plates 6 of their respective blocks and provided with insulated contact-pins 10, normally engaged with the pins 7 of the overlying plates 6, and each contact-pin 10 is connected by a conductor 11 to the long section 1 of the adjacent block of the outer side of the trackway, and it will be noted that the spring-plates 9 are so disposed with respect to the said short sections 3 that the flanges of the wheels of a car or train passing over said section shall engage said arched portions and depress them sufficiently to break the electrical connection between pins 10 and 7.

Referring now to the inner side of the trackway, 12 indicates spring-plates of the same general type as plates 9, secured to the long sections 2 and provided with insulated contact-pins 13, connected by conductors 14 to the sections 2, by which said plates 12 are carried.

15 indicates spring-plates carried by short sections 4 and provided with insulated contact-pins 16, connected by cross-conductors 17 to the short sections 3 of the same blocks. The short sections 4 are also equipped with spring-plates 18 of the same type as plates 15, equipped with insulated contact-pins 19, connected by conductors 20 with the same sections 4, which carry their respective spring-plates 18.

21 represents spring-plates corresponding to plates 12 and secured to sections 2, the said plates underlying plates 18 and having contact-pins 22 normally engaging contact-pins 19 and connected by conductors 23 to the sections 2, which carry their respective spring-plates 21.

24 and 25 indicate two axles of a car or train, which are insulated from each other and equipped with wheels 26 27 and 28 29, respectively. The distance between the wheels on the outer side of the trackway should be such that those upon any section 3 may be between the contiguous long section 1 and arched plate 9, carried by said section 3, so as not to depress said spring until both of said wheels are upon the short section. If the train is moving in the direction indicated by the arrow, one or more wheels (not shown) to the rear of the pair referred to will hold the said spring depressed until said pair of wheels are upon the section 1 of block II.

30 indicates a battery or other source of electric supply carried by the car or train and electrically connected by conductor 31 or otherwise with the axle 24. 32 indicates a conductor leading from the opposite pole of

the battery to a relay 33, electrically connected by a conductor 34 to the axle 25.

When the wheels 26 28 27 29 are respectively traveling on sections 1 and 2 of any block, so as to be electrically connected through said sections, the circuit through battery 30 is complete, and as a result the relay 33 is energized. The energization of the relay attracts the armature 35, pivotally mounted on a pin 36, against the resistance of the spring 37, and therefore withdraws contact 38, carried by the armature, from engagement with the contact 39, carried by pin 40, said pins 36 and 40 forming the terminals of a local circuit consisting of a conductor 41, containing a battery 42, and a signal mechanism, either audible or visual, such as the bell 43, located in the cab occupied by the person in control of the train—viz., the engineer or motorman, by preference. A part of said local circuit is of course composed of the armature and contacts 38 and 39. As long as the parts bear the relation described—viz., first position, Fig. 3—the signal mechanism of the local circuit remains open or inoperative.

When the car or train traveling in the direction indicated by the arrow Fig. 1 assumes the second position, Fig. 3, it will be seen that the spring-plate 12 at the junction of blocks I and II will be depressed by wheel 29 and break the connection between contact-pins 13 and 16 of said plates 12 and 15, respectively, of blocks I and II, and therefore break the electric connection between sections 3 and 2, through cross-conductor 17, connected to the contact-pin 16 of the depressed plate 15, it being also noted that the front pair of wheels 26 27 are resting on the short sections 3 and 4 of block II and the rear pair of wheels 28 29 upon the long sections 1 and 2 of block I. The relation of the parts explained opens the main circuit, and therefore closes and sends a single pulsation of current through the local circuit, provided there is no conductor connecting the long sections of block III. Instantly after the main circuit is broken, as described, it is reëstablished by wheels 28 and 29 rolling onto sections 3 and 4, which being electrically connected to battery 30 causes the current to pass through said battery 30, and therefore break the local circuit. When both sets of wheels are on sections 3 and 4, they occupy the third position, as shown in Fig. 3. When said wheels attain the fourth position, same figure, the foremost ones are on sections 1 and 2 of the block and the others still on sections 3 and 4, and at the same time the foremost wheel 27 by depressing plate 21 separates pin 22 of said plate from pin 19 of the contiguous plate, thus breaking the circuit through battery 30 and permitting spring 37 to operate the armature, and thereby complete the local circuit. This second pulsation of current through the local circuit will signal the engineer or motorman and in practice will follow closely the first signal, so that the engineer or motorman by receiving the double signal will know that the track ahead is open or clear for a safe distance—that is, more than one block of track is open or clear.

If a train, as indicated at 44, should be on sections 1 and 2 of block III as the first-named train assumed the second position, the engineer or motorman would not receive a double-signal, because train 44 by connecting said sections 1 and 2 of block III would complete a circuit through the main battery and as a result prevent the first completion of the local circuit and the first signal produced thereby. The circuit, assuming that one train occupies the second position and the other train electrically connects sections 1 and 2 of block III, is traced as follows: from 30, through 31, 24, 27, 4, (of block II,) 20, 19, 22, 23, 2, (of block II,) 14, 16, 17, 3, (block III,) 5, 4, (block III,) 20, 19, 22, 23, 2, (block III,) 44, 1, (block III,) 11, 10, 7, 8, 1, (block II,) 11, 10, 7, 8, 1, (block I,) 28, 25, 34, 33, and 32 to negative pole of battery 30.

If there are two blocks between the trains, they are a safe distance apart, and consequently the engineer or engineers receive the double or "clear" signal. This is so because the current from the main battery 30 (or batteries 30, if both trains are equipped with signal mechanism) must pass through two resistance-coils, which coils offer such resistance to the current that it is not capable of energizing its relay sufficiently to overcome the resistance of spring 37. As a result said spring will operate the armature and complete the local circuit and give the engineer or motorman the first signal, the second signal invariably following the first, because the breaking of the circuit by the separation of pins 19 and 22 is absolute.

To avoid false signaling behind a train and through the instrumentality thereof, there is provided between the point of juncture of sections 1 and 3 and the contiguous end of spring-plate 9, carried by said sections 3, a space sufficiently long to accommodate the wheels 26 and 28, but not the other wheels of the train behind said wheel 28, as it is necessary that contact between pins 7 and 10 of the corresponding block shall be broken until said wheels 26 and 28 have attained the position marked "fourth position, Fig. 3," where it will be noticed they are on track-sections which are insulated from each other.

Trains running in the direction indicated by the arrow, Fig. 4, assume the four positions of said figure. In the first position the main circuit is broken between pins 19 and 22, so as to complete the local circuit and send out the first signal. When the wheels are in the second position, same figure, the

main circuit is closed. When they occupy the third position, the main circuit is again broken, so as to result in the production of a second impulse of current through the local circuit and the consequent completion of the double signal.

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

1. In a block-signal system for railways, a trackway consisting of alined long and short sections arranged alternately and insulated from each other, and a pair of contacts held yieldingly together with one electrically connected to one of the long sections and the other to the long section at the opposite end of said short section.

2. In a block-signal system for railways, a trackway consisting of alined long and short sections arranged alternately and insulated from each other, a contact electrically connected to one of said long sections, a contact yieldingly engaging the first-named contact and insulated from the short section, a pair of contacts held in yielding engagement; one of them being electrically connected to the short section and the other to the long section at the opposite end of the short section from the first-named long section.

3. In a block-signal system for railways, a trackway consisting of parallel side portions each consisting of long sections and short sections arranged alternately and insulated from each other, a resistance-coil connecting the short sections, a pair of contacts held yieldingly together and insulated from the short section at one side of the trackway and electrically connected to the long sections at opposite ends of the short section; a second pair of contacts held yieldingly together and electrically connected to the last-named short section and to one of the long sections at the opposite side of the trackway, a third pair of contacts held yieldingly engaged and electrically connecting the short section in line with the last-named long section and the long section in line with and at the opposite end of said last-named short section.

4. In a block-signal system for railways, a trackway consisting of parallel side portions each consisting of long sections and short sections arranged alternately and insulated from each other, a resistance-coil connecting the short sections, a pair of contacts held yieldingly together and insulated from the short section at one side of the trackway and electrically connected to the long sections at opposite ends of the short section; a second pair of contacts held yieldingly together and electrically connected to the last-named short section and to one of the long sections at the opposite side of the trackway, a third pair of contacts held yieldingly engaged and electrically connecting the short section in line with the last-named long section and the long section in line with and at the opposite end of said last-named short section, in combination with insulated sets of wheels on the trackway and adapted to successively break the engagement between one of the pairs of contacts of said portion of the trackway, then between the pair of contacts at the other side of the trackway and finally between the other pair of contacts at the first-named side of the trackway.

5. In a block-signal system for railways, a trackway, consisting of parallel side portions each consisting of long sections and short sections arranged alternately and insulated from each other, a resistance-coil connecting the short sections, a pair of contacts held yieldingly together and insulated from the short section at one side of the trackway and electrically connected to the long sections at opposite ends of the short section; a second pair of contacts held yieldingly together and electrically connected to the last-named short section and to one of the long sections at the opposite side of the trackway, a third pair of contacts held yieldingly engaged and electrically connecting the short section in line with the last-named long section and the long section in line with and at the opposite end of said last-named short section, in combination with insulated sets of wheels on the trackway and adapted to successively break the engagement between one of the pairs of contacts of said portion of the trackway, then between the pair of contacts at the other side of the trackway and finally between the other pair of contacts at the first-named side of the trackway, a source of electric supply connected to the insulated sets of wheels, a relay in circuit with said electric supply, an armature for the relay, and a spring to withdraw the armature from the relay when the latter is demagnetized.

6. In a block-signal system for railways, a trackway consisting of parallel side portions each consisting of long sections and short sections arranged alternately and insulated from each other, a resistance-coil connecting the short sections, a pair of contacts held yieldingly together and insulated from the short section at one side of the trackway and electrically connected to the long sections at opposite ends of the short section; a second pair of contacts held yieldingly together and electrically connected to the last-named short section and to one of the long sections at the opposite side of the trackway, a third pair of contacts held yieldingly engaged and electrically connecting the short section in line with the last-named long section and the long section in lines with and at the opposite ends of said last-named short section, in combination with insulated sets of wheels on the trackway and adapted to successively break the engagement between one of the pairs of contacts of said portion of the trackway;

then between the pair of contacts at the other side of the trackway and finally between the other pair of contacts at the first-named side of the trackway, a source of electric supply connected to the insulated sets of wheels, a relay in circuit with said connection, an armature for the relay, a spring to withdraw the armature from the relay when the latter is demagnetized, a local circuit having its terminals adapted to be connected by the armature when withdrawn from the relay, and a signal mechanism in said local circuit.

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

HARRY L. JOHNSON.

Witnesses:
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