No. 768,411. PATENTED AUG. 23, 1904.

C. R. VAN TRUMP.

BLOCK SIGNAL AND TRACK SWITCH OPERATING DEVICE.

APPLICATION FILED APR. 30, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

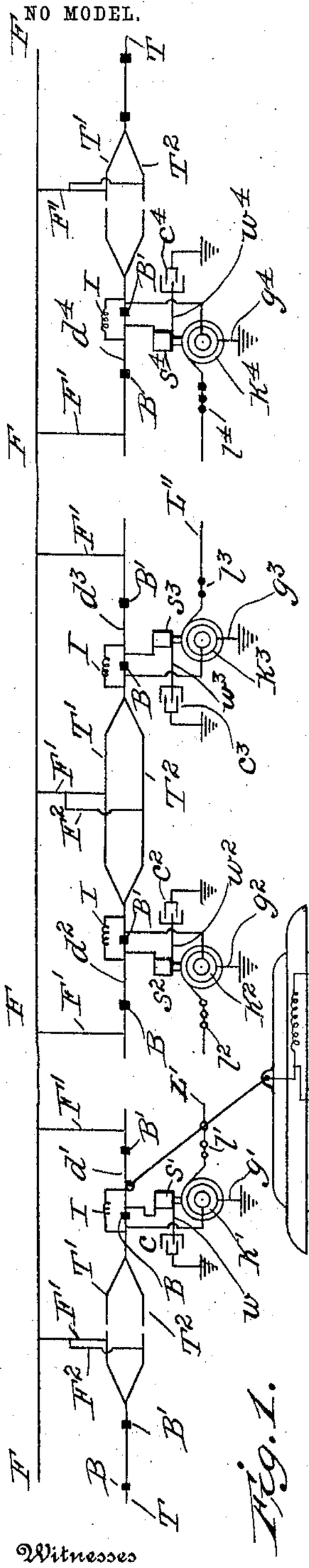

Fig. 1.

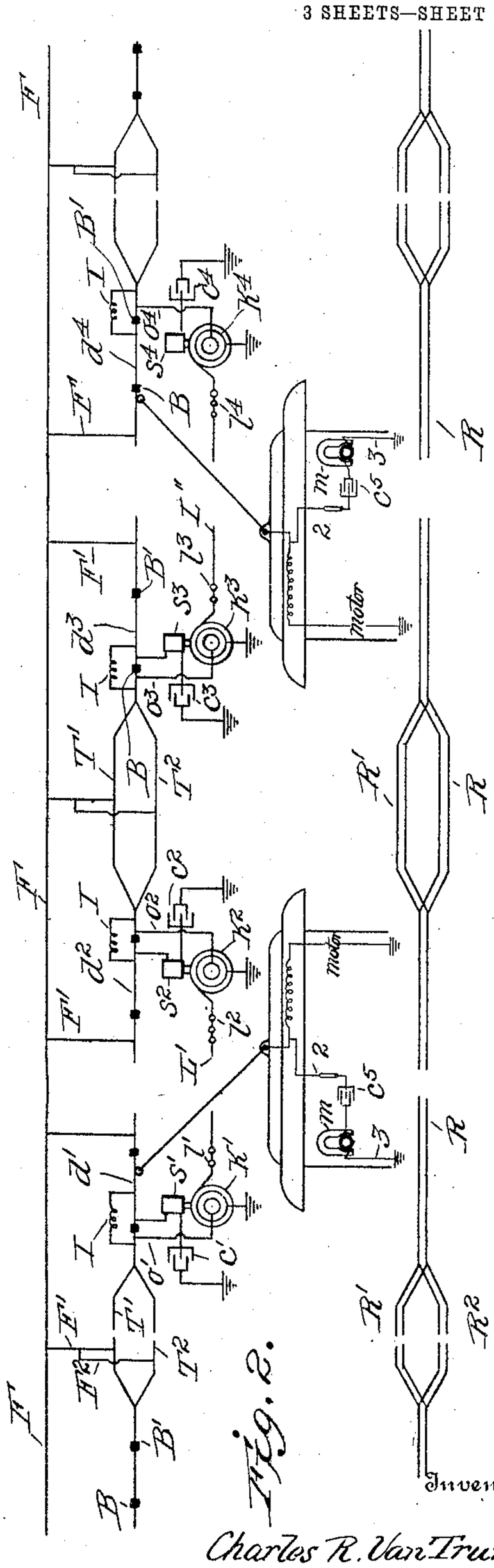

Fig. 2.

Witnesses

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NO MODEL. 3 SHEETS—SHEET 2.

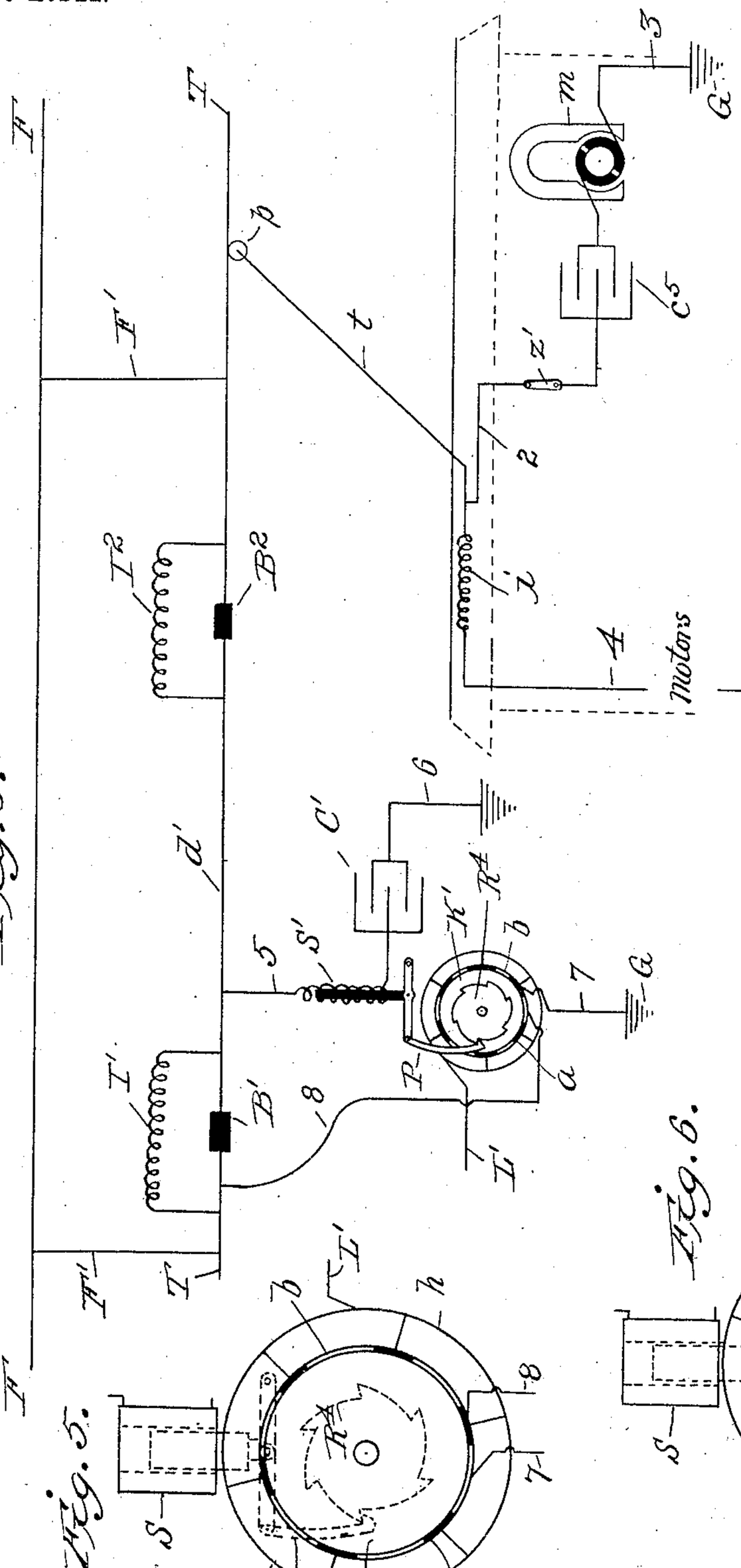

Fig. 3.

Fig. 5.

Fig. 6.

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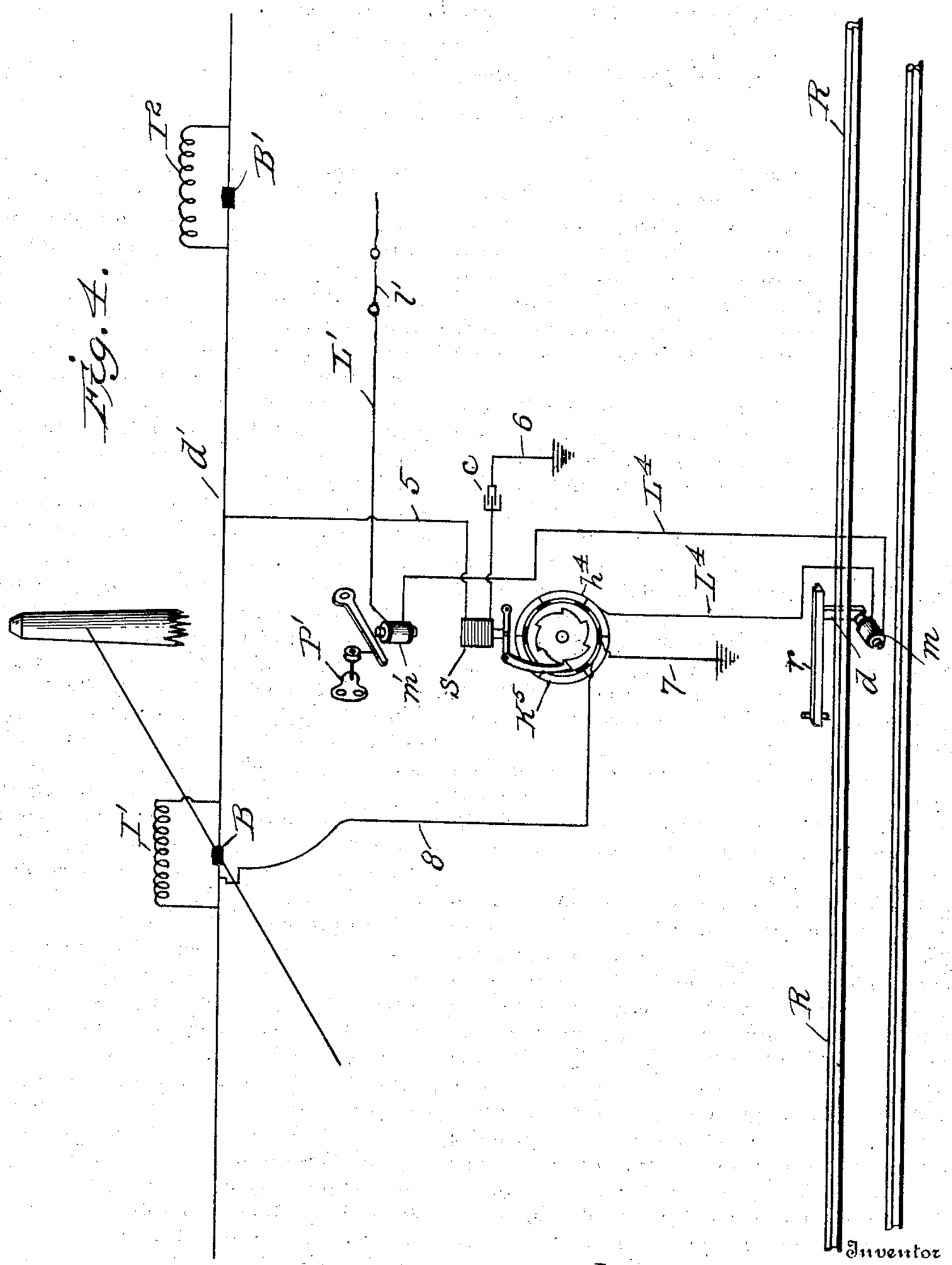
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.



Witnesses
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No. 768,411. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

CHARLES R. VAN TRUMP, OF WILMINGTON, DELAWARE.

BLOCK-SIGNAL AND TRACK-SWITCH OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 768,411, dated August 23, 1904.

Application filed April 30, 1904. Serial No. 205,739. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. VAN TRUMP, a citizen of the United States, and a resident of Wilmington, in the county of Newcastle and State of Delaware, have invented a new and useful Improvement in Block-Signal and Track-Switch Operating Devices, of which the following is a full, clear, and exact description of the same.

My invention relates to block-signal systems and track-switch-operating mechanism which is especially adapted for use on electric railways operated by a trolley or third wire or rail system.

It is the object of my invention to provide a signal system wherein as a car enters any block electrically-operated signals at each end of the block and under the control of the motorman within the moving car will be displayed or switches operated, and as the car leaves the block from either direction the signals and switches will be restored to their normal position.

The invention also includes mechanism which will be included in the same circuit and operated by the same current for operating track-switches—as, for example, derailing, turnout, and other switches.

The invention comprises a power or main circuit, trolley-sections insulated from each other at the ends of the blocks and branch feeders connecting the said main circuit with the said insulated trolley-sections, from which the current is taken by the trolley wheel or shoe to operate the motors and supply the current for the usual lights on electric cars and a return-circuit which may be either a return-wire or the ground, as desired. Extending the length of the block is a signal-wire or signal-circuit, and at each end of said signal-circuit will be placed electrically-operated switches controlling the current from the trolley-wires to either the signal-lights by night, semaphore-operating devices by day, or derailing and other switches, said electric switches being operated by means within the moving car under the control of the motorman and without necessitating the stopping or leaving of the car.

The invention consists of these and other features, which will be more specifically described in the following specification, and particularly pointed out in the appended claims.

Referring to the accompanying three sheets of drawings, forming a part of the specification, and in which similar characters of reference indicate corresponding parts in the different figures, Figure 1 is a diagrammatic view of my block-signal and track-switch operating devices, showing two sections, one of which the car is entering, showing the signal-lights lighted, and the other section being clear the lights are extinguished. Fig. 2 is a similar view with two cars approaching each other and the same turnout-section and the lights of each section lighted, indicating that the sections are in use. Fig. 3 is an enlarged view of the signal-section of the trolley-wire, breakers, switch-operating devices and connections, and the current-producing mechanism and connections within the car for operating the controlling-switches. Fig. 4 is an enlarged view of the signal-section of the trolley-wire, showing a modified form of Fig. 3, in which either a switch and semaphore, or both, are controlled instead of signal-lights. Figs. 5 and 6 are enlarged views of two positions of the controlling-switches and the current-conducting connections.

Referring to Figs. 1 and 2 of the drawings, F F represents a section of the feed-line. T T is a corresponding section of the trolley-wire or third rail or wire, having turnout-sections T' and T^2 at certain intervals, common in single-track systems. F' and F^2 are feeders for supplying current from the feed-line to the trolley-wire. R R represent the rails on which the car travels, having turnouts R' R^2, corresponding to the sections T' and T^2 of the trolley-wire. B B′ are connections of suitable insulating material, which interrupt the continuity of the trolley-wire and are located at each end of a block just before entering the turnout-sections and are sufficiently separated to form signal-sections d' d^2 d^3 d^4, represented by the short lines between any two of the connections. I I are inductances, each of which connects a signal-section with the adjacent live section of the trolley-wire leading to the turnout-section of trolley-wire.

S′ S² S³ S⁴ represent solenoids for operating the three-point rotating switches K′, K², K³, and K⁴, respectively, and which will be hereinafter more fully described. W, W², W³, and W⁴ represent electric conductors connected with the coils of the solenoids S′, S², S³, and S⁴, respectively, which are grounded through condensers c', c^2, c^3, and c^4. o', o^2, o^3, and o^4 are wires leading from the live trolley-wire sections to one of the brushes of the switches K′, K², K³, and K⁴. g', g^2, g^3, and g^4 indicate the wires leading from a second brush of the switches to the ground. L′ and L″ are wires connecting the signal-lights l' and l^2 or i^3 and l^4, semaphores or switch-operating devices at each end of the block, and their ends are connected to brushes which are in contact with the third terminal of the rotating switches, as will be hereinafter described in detail.

Referring to Fig. 3, which shows in an enlarged view a section of the line at the end of a block and a diagrammatic representation of the three-point switch devices, the wiring, condensers, and controlling means within the car for energizing the solenoids for operating said switch. In this figure, F F is the feed-wire, T T is the trolley-wire, B′ B² are the insulated connections therein forming a signal-section d'. I′ I² are the inductances, spanning the connections and connecting the ends of the signal-section to the adjacent live trolley-sections. t is a trolley-pole attached to a car having a wheel p in contact with trolley-wire. i represents an inductance in the same circuit connecting the trolley-pole by wire 4 with the lighting, heating, or power-translating devices within the car and from them to the track or ground. Between the inductance i and the trolley-pole connection are connected, by means of a wire 2, a condenser c^5 and magneto-machine m or other expedient by which an alternating, pulsating, or intermittent current may be generated. The magneto-machine is preferably constructed so as to be operated by hand when so desired by the motorman as the car is passing a signal-section, and while I have shown herein the specific use of a manually-operated magneto-machine I do not wish to limit myself to this exact construction or specific arrangement, as other means may be readily substituted to generate or have under control the proper current within the car in order to energize the solenoid or other switch-controlling devices. One pole or terminal of said magneto-machine or other expedient is connected to the said condenser c^5 and the other to the ground by wire 3. B′ and B² are the connections and I′ and I² the inductances spanning the connections and connecting both ends of the signal-section to the adjacent live sections. d' is an enlarged view of the signal-section of the trolley-wire. S′ is a solenoid having one of its terminals connected to the signal-section d' and the other terminal leading to a condenser C′ and thence to the ground by wire 6. k' is a three-point switch, (see Figs. 5 and 6,) which preferably consists of a number of insulated copper sections $b\ b\ b$, arranged as shown on the surface of a cylinder and rotating on a pivot-point at each end of the cylinder, and said insulated sections are in electrical communication with each other by being all connected to a larger concentric copper cylinder or heel composed of a number of sections $h\ h\ h$. $a\ a\ a$ are the insulating-sections, made, preferably, of porcelain or glass and alternating with the sections $b\ b\ b$. R⁴ is a ratchet-wheel at one end of the cylinder, which is engaged by a pawl P, operated by solenoid S′. L′ is a section of the wire forming the circuit conducting the current from the trolley-section T through wire 8 to the signal-lights or to energize the mechanism for operating the semaphores or switches and from thence to a brush bearing on the conducting-sections $h\ h$ of the heel on the outer or larger rotating cylinder of switch K′. 8 is a conductor leading from the live trolley-section adjacent the signal-section to the brush bearing on the insulating-sections $a\ a$ or the copper conducting-sections $b\ b$ of the smaller rotating cylinder comprising the switch K′. 7 is a conductor leading from a brush bearing on either of sections $a\ a\ b\ b$ of switch K to the ground or a special return-wire circuit. The switches K′ K² will be so designed as not to have the two brushes on the conducting commutator-segments $b\ b$ at the same time, thereby causing a short circuit.

In Fig. 4 is shown substantially the same arrangement of switch and controlling devices with the exception of having the current controlled by the three-point switch operating the signal-lights. The current is also employed to operate semaphores P′ or other signaling devices, and in the same circuit or in series with said semaphores may be derailing or other switches d. The derailing or other switches d in their simplest form consist of a section of a rail r, pivoted at one end near the track, while its other end is drawn over on top of the rail by an electromagnet m, which is connected up in series with the semaphore-operating devices, as will be hereinafter more clearly described. The semaphore P′ is operated by an electromagnet m', and at the other end of the block is a similar set of apparatus and devices, and the current passes through the wire marked L⁴, which connects the brush leading from the heel h^4 of the switch K⁵, thence through the electromagnet m, operating the derailing or other switch through the semaphore-operating magnet m' to the signal device at the other end of the block.

Referring to Figs. 1, 2, and 3, the operation of my invention is as follows: If the signals or other devices are not to be changed, the car proceeds without interruption through the

signal-sections d' d^2 by receiving its current when the trolley-wheel is between the connections B B′ through the inductances I I. If the signal controlling the blocks are to be changed, the magneto-machine *m* (see Fig. 3) is set in operation by the motorman by hand, as shown, or by a small motor under his control. One pole of the magneto-machine is connected to the ground or return circuit and the other pole to the condenser c^5. The pulsating, alternating, intermittent or other proper current generated by the magneto-machine or expedient thus is made to follow the circuit from the condenser c^5 through the conductor 2, trolley-pole *f*, wheel *p*, section d', wire 5, through the coils of the solenoid S′, condenser C, wire 6 to the ground or special return-wire. The upward movement of the core of solenoid S′ and connected pawl P rotates the switch K to such an extent as to cause the next section *a* or *b* to be brought in contact with the brushes connected to the conductors 7 and 8, and thereby light the lights if out or extinguish them if lighted, as will be hereinafter described. The wire 2 leading from the condenser c^5 in the car to the trolley-pole may have a switch z' for cutting out the magneto-machine or other source of current, if desired. The path of the current for the signal-lights, semaphore-operating magnets or derailing-switches in the circuit of the wire L′ is as follows: The current of the trolley-wire T passes through the wire 8 to a brush bearing on either one of the insulating-sections *a a* or the conducting-sections *b b* of the switch K′. If the brush is bearing on one of the conducting-sections *b b*, the current passes to the heel *h* through brush, signal-circuit wire L′. If the brush of wire 8 is bearing on an insulated section and the brush of wire 7 is bearing on a conducting-section, then the current from another connection similar to 8 is passing through the signal-circuit to the ground or special circuit wire.

From the foregoing description of switches K′ K^2 at either end of the wire L′ and their connections it will be seen that in one position of said switches, as indicated in Fig. 6, if the line L′ has one end connected to the live trolley-wire and the switch at the other end of the block to the ground, as shown in Fig. 5, or vice versa, the lights will be lighted. If both switches at the end of the line are connected to the ground or both to the trolley, the lights are extinguished. It is therefore obvious that the changing of one of the switches K′ K^2 at either end of the block would change the condition of the lights, semaphores, or switches and light the lights if out or change the position of the semaphores or derailing and other switches. Accordingly, if as a car arrives at the end of the block indicated by Z (see Fig. 1) and is about to pass from the turnout-section into the signal-section of the trolley-wire and finds the block clear by the signal-lights being out the motorman by the means heretofore described throws the switch K′ one notch, which lights the lamps l' l^2 at both ends of the block just about to be entered, thus protecting such block. After the car has proceeded the full length of the block and arrives at the terminus and passing over the signal-section at this end of the block again throws the switch K^2 one notch at this end of the block in a similar manner as described above, when the lights are again extinguished, showing the car has passed beyond the block and the track is clear. If, however, as the car approaches the end of the block on the turnout-section and the block is guarded by the lights, he stops on such turnout-section until the approaching car passes the switch of the turnout-section, when they both proceed without changing the lights. If the block the car is about to enter is cleared, the motorman clears the block in his rear and proceeds guarding the block he is about to enter with the lights above.

From the above description it will be seen I have devised a simple and inexpensive means for protecting a single-track system, in that there is only one line of wire connecting the two ends of the block-signal devices and only one set of operating devices at each end, thus minimizing the amount of wire and mechanism to be disarranged and become inoperative and need attention. There is no confusion of red, white, or colored lights in my system. The car always travels toward a light, and as soon as the motorman encounters a light he is aware the block is not clear. When he sees no lights, he can pass through the turnout-sections to the next block, operating the switches to turn on the lights or semaphores to guard the block he is about to enter without leaving his car and with little effort.

Various changes may be made in the details of the system without departing from the spirit of my invention as expressed in the appended claims, and while I have in the foregoing described specifically one form of apparatus and one system of wiring adapted to accomplish the result aimed at, yet it will be obvious to those skilled in the art that the electrical connections, the specific construction of the switches, and other details may be modified in many ways without changing in any way the operation of the mechanism or departing from my invention. For example, it would involve the same invention if the inductances I I, spanning the connections B B′ of the signal-sections be attached to feed-wires supplying the dead sections from the feed-line instead of the trolley-line, as shown, or for the derailing switch any other form of switch could be substituted—as, for example, a main-track switch commonly used at street corners and turnouts.

Having now described my invention, what

I claim as new, and desire to secure by Letters Patent, is as follows:

1. A signal system for railways comprising a series of blocks, a trolley or current-conducting circuit, a signal-section in the trolley or current-conducting circuit at the end of each block, a return or ground circuit, a signal-switch for the ends of each block, independent signal-circuits connecting the signal-switches of each block with each other, signal devices at the ends of each block and in the independent signal-circuits, a switch-operating device for each of the signal-switches and electrically connected to a signal-section, and means within the car for passing a current to a signal-section and switch-operating device.

2. A signal system for railways or the like comprising a series of blocks, a trolley or current-conducting circuit, a signal-section in the trolley or conducting-circuit at the end of each block, a return or ground circuit, an electric switch for the ends of each block, a series of independent signal-circuits connecting the switches of each block with each other, a signal device at the ends of each block and in the independent signal-circuits, a switch-operating device for each switch, electric conductors connecting each switch-operating device with a signal-section, conductors connecting each switch with the trolley or conducting-circuit and the ground or return circuit, and means for passing a current from the car to a signal-section and switch-operating device.

3. A signal system for railways comprising a series of blocks, a feeding-circuit, a power-circuit consisting of a series of independent block or trolley sections, a signal-section at each end of the block-sections, auxiliary feeders connecting the feeding-circuit to the block or trolley sections, a return or ground circuit, an electric switch for the ends of each block, a series of independent signal-circuits connecting the switches of each block with each other, a signal device at the ends of each block and in the independent signal-circuits, a switch-operating device for each switch, electric conductors connecting each switch-operating device with a signal-section, conductors connecting each switch with the trolley or conducting-circuit and the ground or return circuit, and means for passing a current from the car to a signal-section and switch-operating device.

4. A signal system for railways comprising a series of blocks, a power-circuit, live trolley-sections having insulating connections forming short signal-sections at each end of the live trolley sections or blocks, inductances spanning the connections and connecting the immediate live trolley-sections, a return or ground circuit, an electric switch for the ends of each block, a series of independent signal-circuits connecting the switches of each block with each other, a signal device at the ends of each block and in the independent signal-circuits, a switch-operating device for each switch, electric conductors connecting each switch-operating device with a signal-section, conductors connecting each switch with the trolley or conducting-circuit and the ground or return circuit, independent means for operating any one of the switches, and means on the car for passing a current therefrom and energizing any one of the operating means for the switches.

5. A signal system for railways comprising a series of blocks, a power-circuit, live trolley-sections having insulating connections forming short signal-sections at each end of the live trolley sections or blocks, inductances spanning the connections and connecting the immediate live trolley-sections, a return or ground circuit, an electric switch for the ends of each block, a series of independent signal-circuits connecting the switches of each block with each other, a signal device at the ends of each block and in the independent signal-circuits, a switch-operating device for each switch, electric conductors connecting each switch-operating device with a signal-section, conductors connecting each switch with the trolley or conducting circuit and the ground or return circuit, and means for energizing the switch-operating devices by a current generated within the car and passed through a signal-section and switch-operating device.

6. A signal system for railways or the like comprising a series of blocks, a trolley or current-conducting circuit, a return or ground circuit, a signal at the end of each block, independent electric circuits connecting the signal at the end of each block with each other, an electric switch for the end of each block and controlling the signals thereof, means for passing a current through each of the switches or connecting them with the ground or return circuit, independent means for operating any one of the switches, and means on the car for passing a current therefrom and energizing any one of the operating means for the switches.

7. A signal system for railways or the like comprising a series of blocks, a signal at the end of each block, independent electric circuits connecting the signal at the end of each block with each other, an electric switch for the end of each block and controlling the signals thereof, means for passing a current through each of the switches and independent electric circuits for connecting them with the ground or a return circuit, independent devices for operating any one of the switches, and means on a moving car for passing a current therefrom and energizing any one of the switch-operating devices.

8. A signal system for railways or the like comprising a series of blocks, a trolley or current-conducting circuit, a signal-section in the trolley or conducting-circuit at the end of each block, a return or ground circuit, an

electric switch for the ends of each block, a series of independent signal-circuits connecting the electric switches of each block with each other, a signal device at the ends of each block and in the independent signal-circuits, a switch-operating device for each electric switch, an electric conductor having a condenser and connecting each switch-operating device with a signal-section, conductors connecting each electric switch with the trolley or conducting-circuit and the ground or return circuit, and means for passing a current from the car to a signal-section and switch-operating device.

9. A signal system for railways or the like comprising a series of blocks, a trolley or current-conducting circuit, a signal-section in the trolley or conducting-circuit at the end of each block, a return or ground circuit, an electric switch for the ends of each block, a series of independent circuits connecting the electric switches of each block with each other, a signal device and means for operating a rail-switch at the ends of each block and in the independent circuits, a switch-operating device for each electric switch, electric conductors connecting each switch-operating device with a signal-section, conductors connecting each switch with the trolley or conducting-circuit and the ground or return circuit, and means for passing a current from the car to a signal-section and switch-operating device.

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

CHARLES R. VAN TRUMP.

Witnesses:

CHAS. N. TRUMP,

JAMES H. HOFFECKER, Jr.