No. 842,432. PATENTED JAN. 29, 1907.

H. SMELSER.

ELECTRIC SIGNAL FOR RAILWAYS.

APPLICATION FILED OCT. 7, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

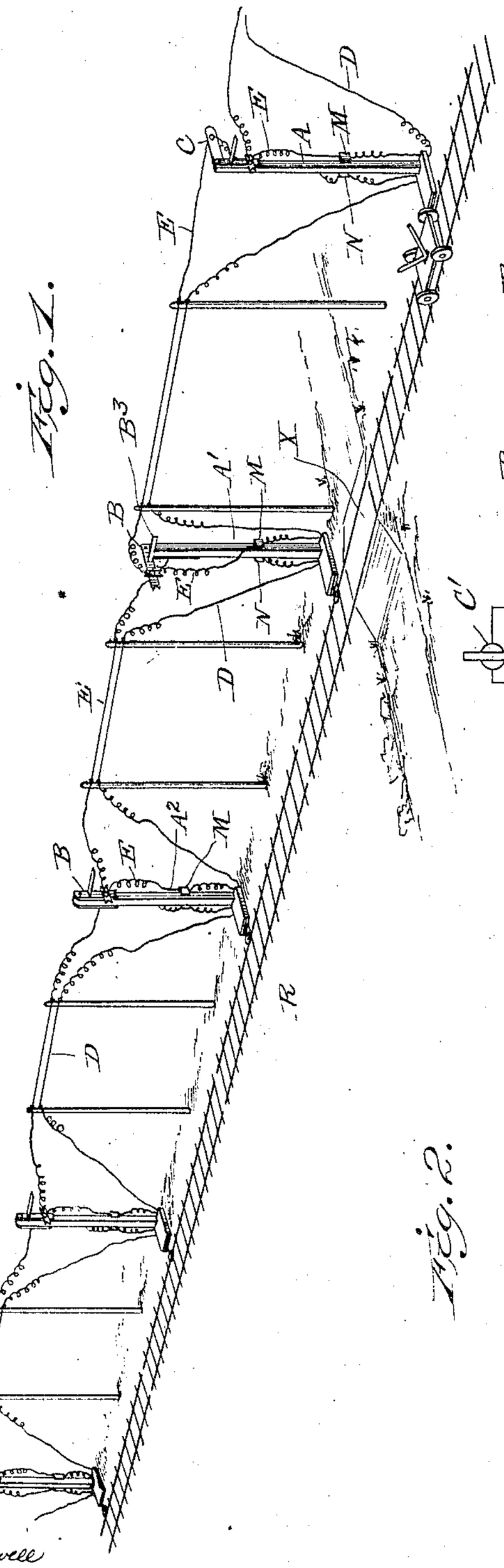
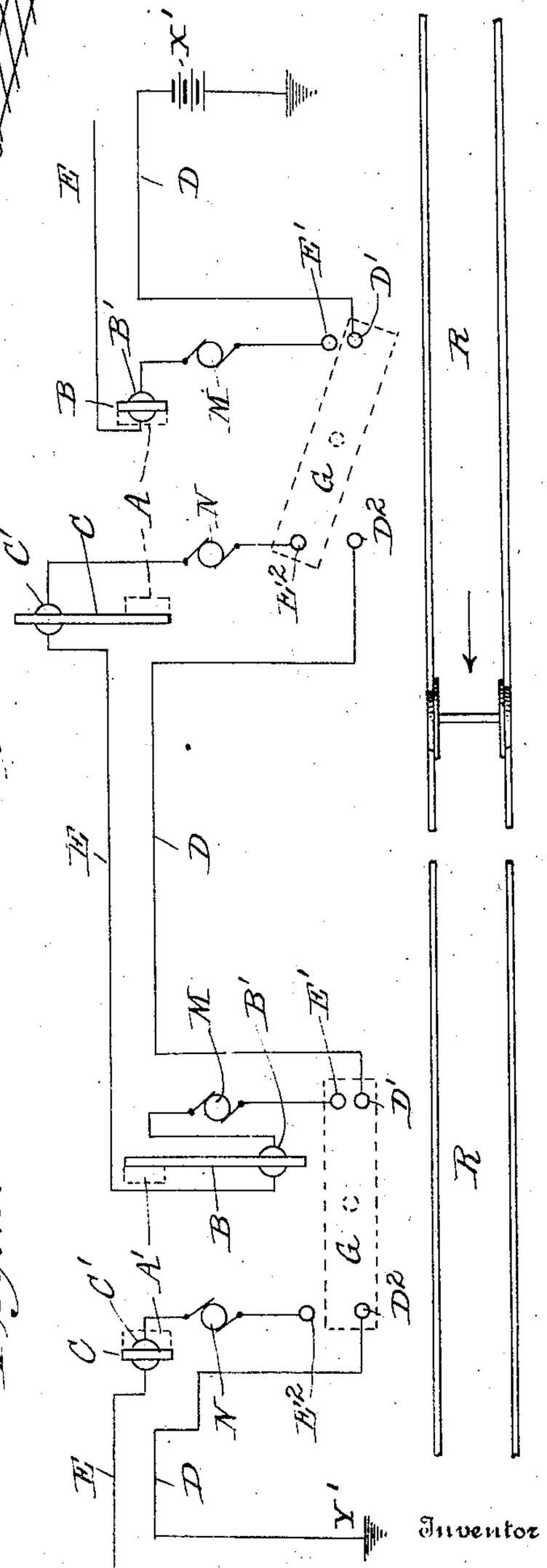


Fig. 2.



Witnesses:
Edwin L. Yewell
Gertrude M. Stricker

Inventor
Horatio Smelser
by
Grant Burroughs
Attorney

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3 SHEETS—SHEET 2.

Fig. 1.

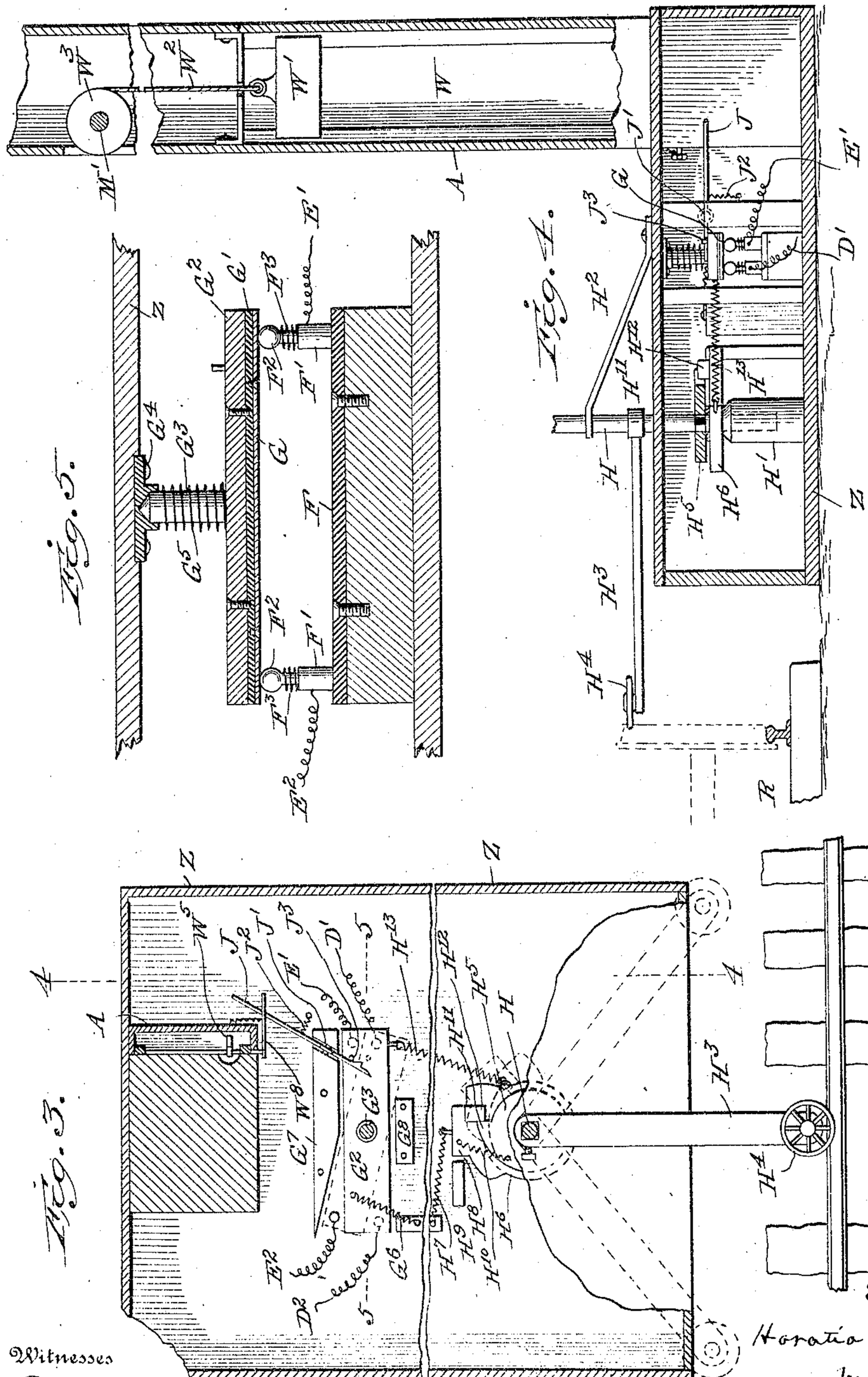

Fig. 2.

Fig. 3.

Witnesses
Edwin L. Yewell
Gertrude M. Stocker.

Inventor
Horatio Smelser
by
Grant Burroughs
Attorney

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3 SHEETS—SHEET 3.

Fig. 6.

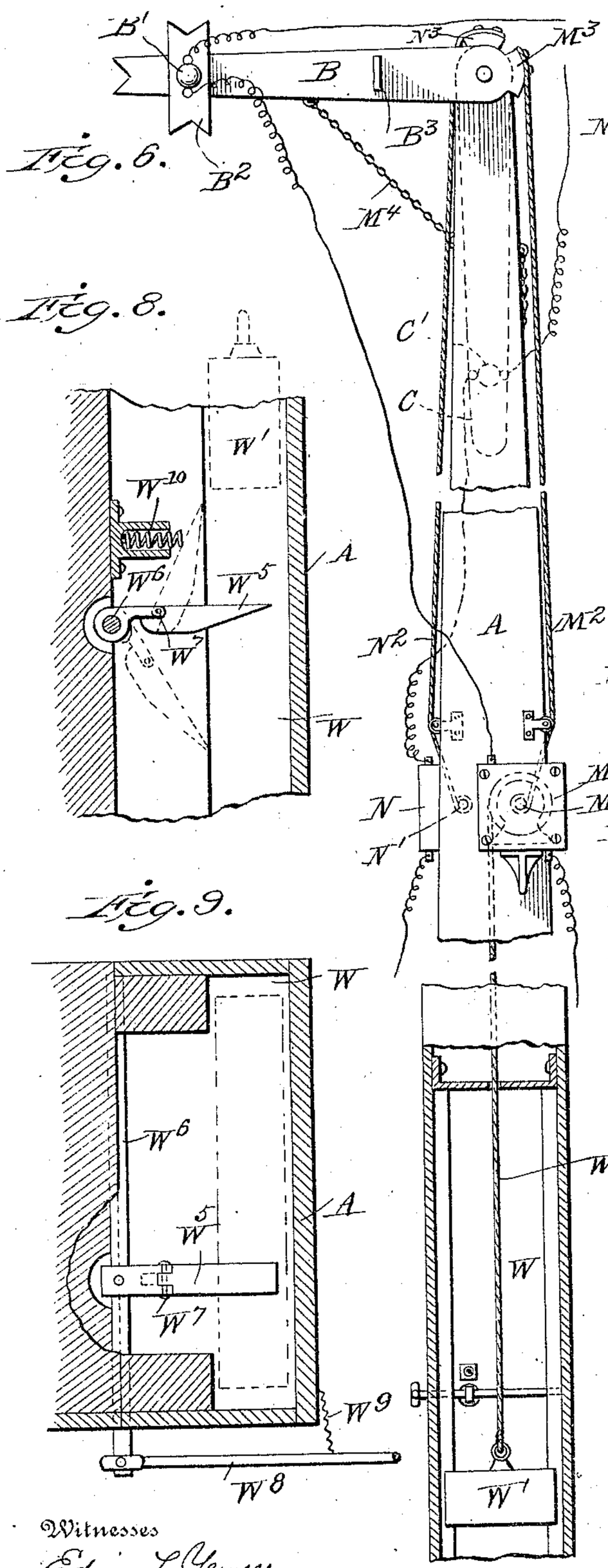


Fig. 7.

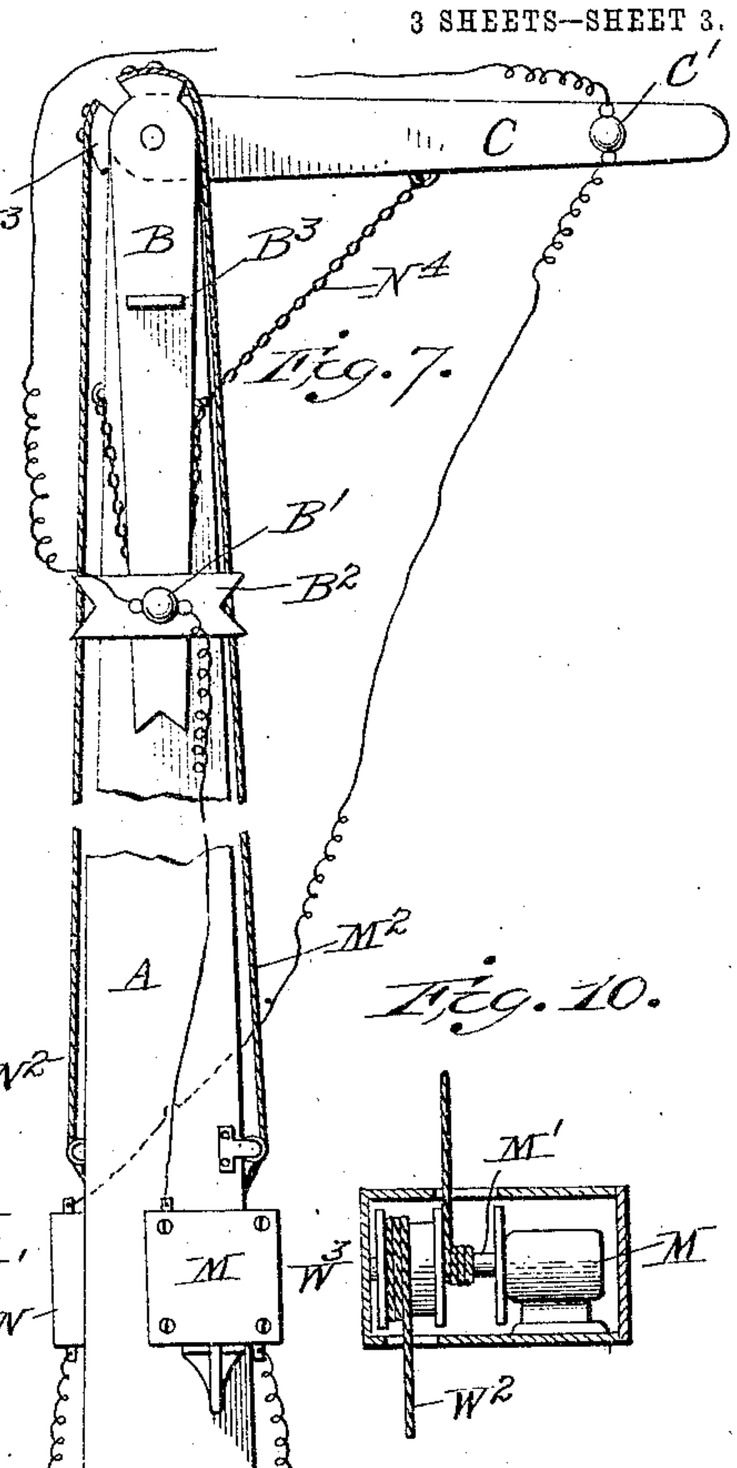
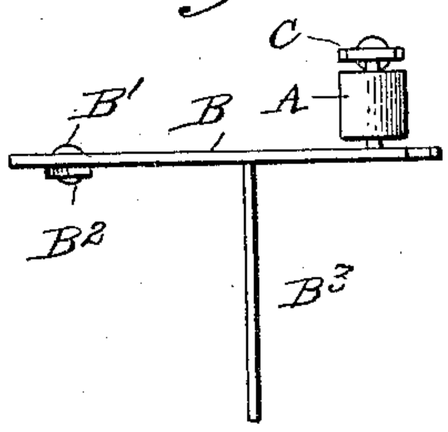


Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.



Witnesses

Edwin L. Jewell

Gertrude M. Stucker

Inventor

Horatio Smelser

by

Grant Burroughs

Attorney

UNITED STATES PATENT OFFICE.

HORATIO SMELSER, OF ASHTON, NEBRASKA.

ELECTRIC SIGNAL FOR RAILWAYS.

No. 842,432. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed October 7, 1905. Serial No. 281,758.

To all whom it may concern:

Be it known that I, HORATIO SMELSER, a citizen of the United States, and a resident of Ashton, in the county of Sherman and State of Nebraska, have invented certain new and useful Improvements in Electric Signals for Railways, of which the following is a full, clear, and exact description, such as will enable those skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The invention has for its object the provision of means operated by a passing train that will raise in advance of the train a head-end signal and simultaneously raise a rear-end signal back of the train and which will at the same time lower the head-end and rear-end signals in the section through which the train has just passed.

The invention consists in the novel construction, combination, and arrangement of parts, such as will be hereinafter fully described, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawings, in which similar reference characters designate corresponding parts, Figure 1 is a perspective view of a section of railroad embodying the invention. Fig. 2 is a diagrammatic view showing the system of circuits for operating the signals. Fig. 3 is an enlarged detail sectional view showing the switch mechanism for connecting the terminals of the conductors. Fig. 4 is a sectional view on the line 4 4 of Fig. 3. Fig. 5 is a sectional view on line 5 5 of Fig. 3. Fig. 6 is a side elevation, partly in section, of one of the signal-towers, showing one of the signal-arms raised and the other one lowered. Fig. 7 is a similar view showing the signal-arms reversed. Fig. 8 is a detail sectional view showing the tripping mechanism for operating the switch-plate. Fig. 9 is a similar view at right angles to the one shown in Fig. 8. Fig. 10 is sectional view showing one of the motors for raising the signal-arm. Fig. 11 is a plan view of one of the towers, showing one of the signal-arms raised and the other one lowered.

Signal-towers A A′ A² of the usual construction are placed at intervals along the railroad-track R. On the upper end of each tower and on opposite sides of the same are pivoted the semaphore-arms B and C, respectively. These arms are pivoted at their ends so as normally to hang vertically along the sides of the tower. The arm B is colored red and is provided with an electric lamp B′ to give a similarly-colored light, and the arm C is colored white and has an electric lamp C′ to give a light of the same color. To distinguish the two arms further, the arm B has a cross-piece B² near its free end. Other means may be used for distinguishing the two arms. The arm B is also provided with an auxiliary arm B³, projecting at right angles from the same. When the arms are raised, they will project at right angles across the track, so as to be readily seen from the cab of an approaching engine. The auxiliary arm B³ can be seen from either side of a crossing, as at X, over which it may project. The purpose of the arm B is to indicate the approach of a train and may be termed the "head-end" signal. The purpose of the arm C is to indicate that a train has just passed and may be called the "rear-end" signal. By means of the distinguishing-marks on the arms it can be readily ascertained whether a train is approaching a particular tower or if it has just passed the same.

Train-operated mechanism is provided so that when a train passes a particular tower the head-end signal at that tower is lowered and the rear-end signal is raised and at the same time the head-end signal at the next tower is raised and the rear-end signal at the last tower passed is lowered. As the operative mechanisms at the different towers are alike, a description of one will suffice for all. An electric conductor D extends along the railroad and is connected with a source of electricity at one end of the line, as at X′, and at the other end of the line it has a ground connection, as at Y′. The source of electricity also has a ground connection, and the circuit between the ends of the conductor is thereby completed. At each signal-tower the conductor has terminals D′ and D², respectively. Adjacent to these terminals are the terminals E′ and E², respectively, of the branch conductors E, extending between the towers. These terminals are mounted on the plate F, of insulating material, secured to a suitable support. Each terminal comprises a binding-post F′, secured to the plate F, a contact F², of conducting material, movable in the binding-post, and a spring F³, normally pressing the contact upward.

Switch mechanism is provided for completing the circuit through the different terminals. Movable on the terminals is the plate G, of conducting material, secured to the insulating-plate G′, attached to the support G^2. On the upper side of the support is the spindle G^3, with its upper end journaled in the socket G^4, secured to the under side of the casing Z. The latter incloses the switch mechanism and protects it from injury and from the weather. A spring G^5 around the spindle, between the socket G^4 and the support G^2, presses the plate G downwardly. The spring G^5 and the springs F^3, acting against each other, insure an electrical contact between the terminals and the plate. The springs also compensate for any irregularity in the movement of the switch-plate. The switch-plate is held in its normal position, as shown in full lines in Fig. 3, by the spring G^6, connecting it with a fixed part of the device. The movement of the switch-plate, as indicated by dotted lines in the said figure, is limited by the stops G^7 and G^8 on opposite sides of the support G^2.

Mechanism is provided so that the switch-plate G will be moved by a passing train. A shaft H is journaled at its lower end in the step H′ on the floor of the casing Z, and its upper end, which projects above the casing, is journaled in the bracket H^2, secured to the top of the casing. On the upper end of the shaft outside of the casing is the operating-arm H^3, having at its outer end the roller H^4, projecting into the path of travel of the train. On the lower end of the shaft inside of the casing are the blocks H^5 and H^6, respectively. The upper block H^5 is fast on the shaft and the lower block H^6 is loose thereon. A spring H^7 connects the lower block with a fixed part of the device and normally holds its shoulder H^8 against the stop H^9. A spring H^{10} connects the two blocks and normally holds the shoulder H^{11} on the upper block against the stud H^{12} on the lower block. It is obvious by means of this construction when the shaft H is rotated in one direction, so that the shoulder H^{11} engages with the stud H^{12}, the lower block will be partly rotated; but when the shaft is rotated in the opposite direction there will be no movement of the lower block. A spring H^{13} connects the lower block H^6 with the support G^2, as at G^9. This spring is considerably stronger than the spring G^6, so that when the lower block is rotated the switch-plate will also be partly rotated.

When the switch-plate is moved from its normal position to the one indicated by dotted lines in Fig. 3, means are provided for holding it in the latter position against the action of the spring G^6. In the stop G^7 is pivoted the dog J with its fulcrum at J′. One end of this dog projects over the support G^2, and the other end is pressed upwardly by the spring J^2. When the switch-plate is moved to the position indicated in dotted lines, the dog engages with the pin J^3 and holds the plate in that position until it is moved to release the same.

The semaphore-arms B and C are raised by means controlled by the train-operated switch mechanism. On each signal-tower are the electric motors M and N, respectively. These motors, respectively, drive the shafts M′ and N′. On the shafts are wound the wire ropes M^2 and N^2. The rope M^2 leads to the signal-arm B, where it is secured to the shoulder M^3. Likewise the rope N^2 leads to the signal-arm C and is attached to the shoulder N^3. When the shafts are turned to wind the cords, the arms are raised, their upward movements being limited by the chains M^4 and N^4, which prevent the arms from being raised above the horizontal. The motor N at one tower and the motor M at the next tower are electrically connected with the same branch conductor E, extending between the towers. The conductor E is also electrically connected with the lamps B′ and C′ on their respective arms.

Trip mechanism is provided for releasing the switch-plate from the dog J, so that the spring G^6 can return the switch-plate to its normal position. In the side of the tower is the guideway W, and movable therein is the weight W′, carried by the rope W^2, wound on the drum W^3 on the shaft M′ of the motor M. In the lower part of the guideway is the jointed arm W^5 on the rock-shaft W^6, journaled in the base of the tower. The two members of the arm W^5 are connected by the knuckle-joint W^7, which permits the outer member of the arm to close on the inner member when moved upwardly, but which will prevent the outer member from passing a straight line common to both members when moved downwardly. On an end of the rock-shaft W^6 is the lever W^8 in a position to strike the dog J when the rock-shaft is turned for that purpose. The arm is normally held in a horizontal position in the guideway by the spring W^9, connecting the lever W^8 with the frame of the tower. When the weight W′ descends, it strikes the arm W^5 and turns the rock-shaft W^6, which causes the lever W^8 to strike the dog J, and thereby releases the switch-plate, so that the spring G^6 can move the latter to its normal position. After the weight passes the arm the latter is raised to its normal position by the spring W^9. The knuckle-joint W^7 permits the outer end of the arm to be raised by the weight when the latter moves upwardly. A buffer-spring W^{10} operates to throw the arm down should it have a tendency to remain in an upturned position.

The operation of the device is as follows: As shown in the diagrammatic view Fig. 2, it is assumed that the train has passed tower A and is approaching tower A′. The switch

G at the tower A′ is in its normal position electrically connected with the terminals D′, D², and E′. In passing it may be observed that the switch is always in electric contact with the terminal D′ of the main conductor. When the train passed tower A, the switch there was turned by the train-operated mechanism to connect the terminals D′ and E² and to disconnect the terminals D² and E′. This cut out the main conductor D, leading to the tower A′, and completed the circuit through the branch conductor E, leading from the terminal E² at the tower A to the terminal E′ at the tower A′. With the connections so arranged the current passes from the battery X′ through the main conductor D to the terminal D′ at the tower A. There it is diverted by the switch G to the terminal E² of the branch conductor E. It passes through the motor N and the lamp C′ at that tower. It then continues through the branch conductor E to the tower A′, where it passes through the lamp B′ and the motor M to the terminal E′ of the branch conductor. At this tower the switch G is in its normal position, so the current passes from the terminal E′ through the switch to the terminal D² of the main conductor D, through which it passes to the ground connection Y′ and completes the circuit with the ground connection of the battery X′. Only two stations or towers are shown in the diagrammatic view, as to show more would be mere repetition. Only a single source of electricity for the entire system is disclosed; but, if necessary, this can be augmented at intervals along the line to meet the requirements. The current passing through the branch conductor energized the motor N at the tower A and the motor M at the tower A′. The motor N through the intervening mechanism raised the rear-end signal C at the tower A and the motor M raised the head-end signal B at the tower A′. The lamps in the raised arms, which were also brought into the circuit, were also lighted. When the motor M was set in motion, it also raised the weight W′ at the tower A. With the train in the position indicated, back of it is the raised rear-end semaphore C at the tower A and in front of it is the head-end signal B at the tower A′. As the current flows through the branch conductor the energized motors will hold the semaphores in a raised position until the circuit through the branch conductor is interrupted. When the train reaches the tower A′ through the train-operated mechanism, the switch G there will be thrown to disconnect the terminal E′. When this happens, the circuit through the branch conductor leading from the tower A to the tower A′ will be broken and the motors in the said circuit will be deënergized. This will permit the head-end signal at the tower A′ and the rear-end signal at the tower A to fall. The weight W′ at the tower A is also released, and as it falls in the guideway W it strikes the arm W⁵ and through the intervening mechanism moves the dog J to free the switch at that tower, so that the spring G⁶ can act to return the switch to its normal position. At the same time the switch breaks the circuit at the terminal E′ it also breaks it at D² and completes it at the terminal E² through the branch conductor E, leading from the tower A′ to the tower A², to repeat the operation of raising the rear-end signal at the tower A′ and also of raising the head-end signal at the tower A².

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

1. In electric signals for railways, head-end and rear-end signals arranged at intervals along the track, an electric motor for operating each signal independently of the other signals, branch electric conductors extending between said signals with each conductor connected with the motor of a rear-end signal and with the motor of a head-end signal, a main electric conductor extending along the track, and switch mechanism operating to complete the circuit from said main conductor through one branch conductor and simultaneously operating to break the circuit from the main conductor through another branch conductor.

2. In electric signals for railways, head-end and rear-end signals arranged at intervals along the track, an electric motor for operating each signal independently of the other signals, branch electric conductors extending between said signals with each conductor connected with the motor of a rear-end signal and with the motor of a head-end signal, a main electric conductor extending along the track, switch mechanism operating to complete the circuit from said main conductor through one branch conductor and simultaneously operating to break the circuit from the main conductor through another branch circuit, and train-operated mechanism for moving said switch mechanism.

3. In electric signals for railways, head-end and rear-end signals arranged at intervals along the track, an electric motor for operating each signal independently of the other signals, branch electric conductors extending between said signals with each conductor connected with the motor of a rear-end signal and with the motor of a head-end signal and the contiguous conductors having adjacent terminals, a main electric conductor extending along the track and having terminals adjacent to the terminals of said branch conductors, and a switch continuously in electric contact with one of the terminals of said main conductor and operating to make or to break the circuit through the

other terminal of the main circuit and through the adjacent terminals of the branch conductors.

4. In electric signals for railways, head-end and rear-end signals arranged at intervals along the track, an electric motor for operating each signal independently of the other signals, branch electric conductors extending between said signals with each conductor connected with the motor of a rear-end signal and also with the motor of a head-end signal and the contiguous conductors having adjacent terminals, a main electric conductor extending along the track and having terminals adjacent to the terminals of said branch conductors, a switch continuously in electric contact with the one of the terminals of said main conductor, and train-operated mechanism for moving said switch to complete the circuit through the other terminal of the main conductor or through the adjacent terminals of the branch conductors.

5. In electric signals for railways, electrically-operated signals arranged at intervals along the track, branch electric conductors extending along the track and each conductor connected with a head-end and with a rear-end signal, a main electric conductor extending along the track, and switch mechanism actuated by a passing train to complete the circuit through the branch conductor in advance of the train and to interrupt the circuit through the branch conductor in the rear of the train.

6. In electric signals for railways, head-end and rear-end signals arranged at intervals along the track, an electric motor for each signal, branch electric conductors extending between the signals with each conductor connected with the motor of a head-end signal and with the motor of a rear-end signal, a main electric conductor extending along the track, and switch mechanism actuated by a passing train to complete the circuit through the branch conductor in advance of the train and to interrupt the circuit through the branch conductor in the rear of the train.

7. In electric signals for railways, head-end and rear-end signals arranged at intervals along the track, an electric motor for each signal, branch electric conductors extending between the signals with each conductor connected with the motor of a head-end signal and with the motor of a rear-end signal, a main electric conductor extending along the track, switch mechanism actuated by a passing train to complete the circuit through the branch conductor in advance of the train and to interrupt the circuit through the branch conductor in the rear of the train, catch mechanism for holding the switch mechanism in the position to which it has been moved while the branch conductor in advance of the train is in circuit, and tripping mechanism operated by the interruption of the circuit in the branch conductor in the rear of the train for disengaging the catch mechanism to permit the switch mechanism to return to its original position.

8. In electric signals for railways, a tower, a signal-arm hinged on said tower, an electric lamp on said signal-arm, an electric motor for raising said signal-arm, a branch conductor connected with said motor and said lamp, a main conductor, switch mechanism actuated by a passing train for completing the circuit from said main conductor through said branch conductor, catch mechanism for holding the switch mechanism in the position to which it has been moved, tripping mechanism for disengaging the catch mechanism from the switch mechanism, and springs for returning the switch mechanism to its original position after the latter has been released from the catch mechanism.

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

HORATIO SMELSER.

Witnesses:
A. SWEDSTROM,
W. M. SMELSER.