(No Model.) 2 Sheets—Sheet 1.

W. H. WILSON.

AUTOMATIC ELECTRIC TRAIN SIGNAL AND CONTROLLING DEVICE.

No. 435,340. Patented Aug. 26, 1890.

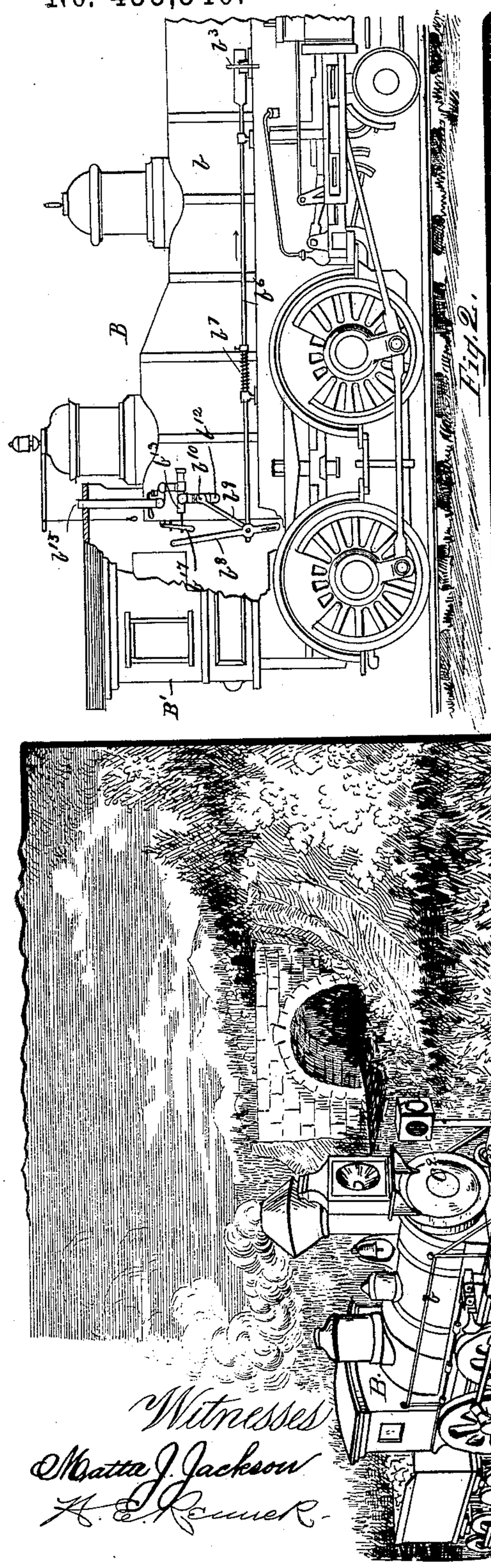

Fig. 2.

Witnesses
Martin J. Jackson
H. E. Kenner.

Inventor
William H. Wilson
by Wilkinson Gudrew
his attys.

(No Model.) 2 Sheets—Sheet 2.

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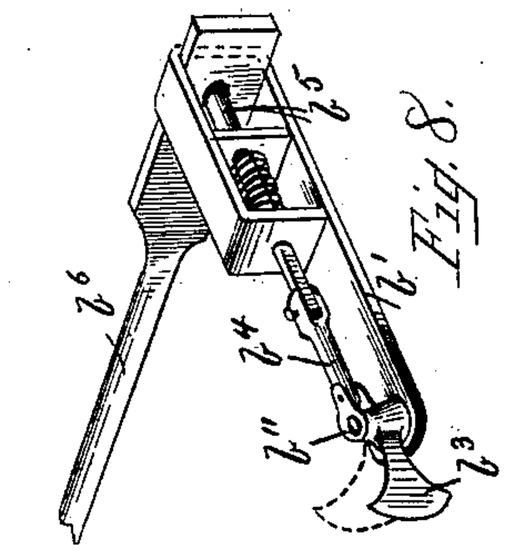

Fig. 8.

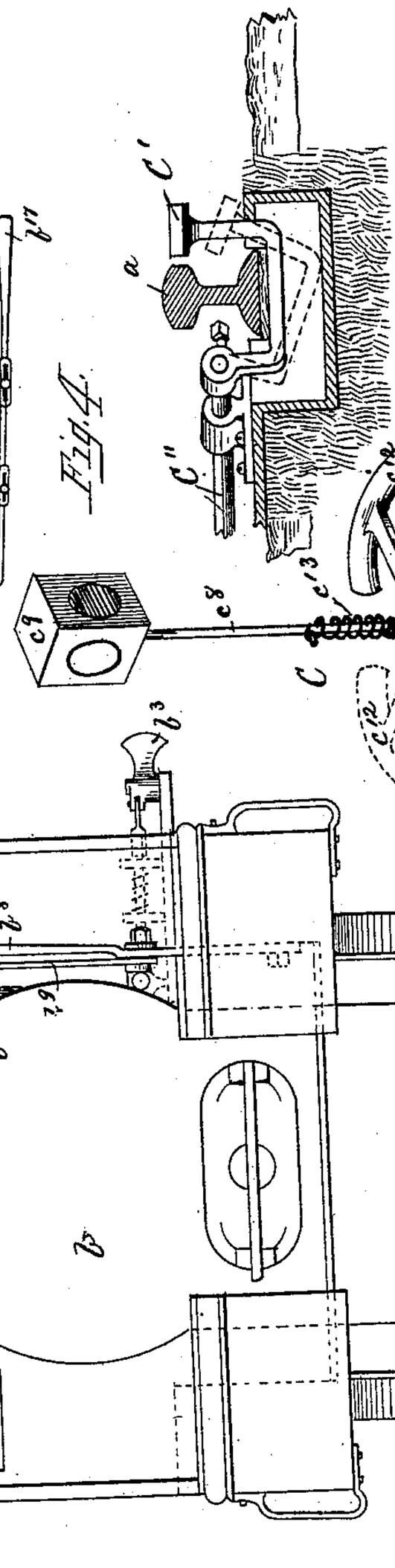

Fig. 4.

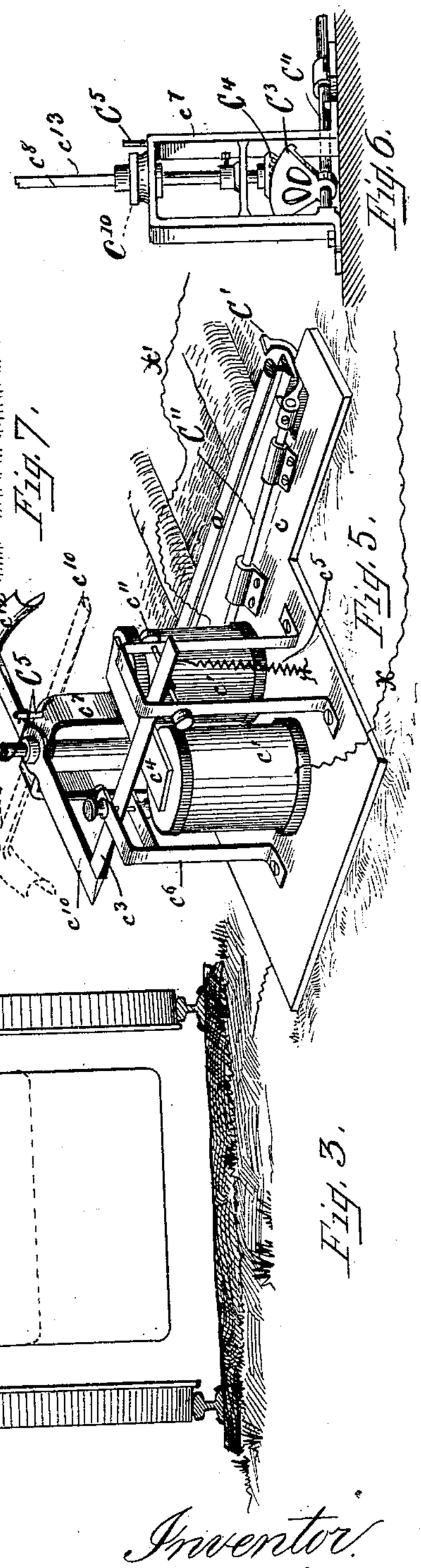

Fig. 6.

Fig. 7.

Fig. 5.

Fig. 3.

Witnesses
Mattie J. Jackson
A. E. Reuick.

Inventor.
William H. Wilson
by Albert Andrén his atty.

UNITED STATES PATENT OFFICE.

WILLIAM H. WILSON, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO WILLIAM J. KELLY, OF BOSTON, AND CHARLES H. ARNOLD, OF WOBURN, MASSACHUSETTS.

AUTOMATIC ELECTRIC TRAIN SIGNAL AND CONTROLLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 435,340, dated August 26, 1890.

Application filed July 27, 1889. Serial No. 318,978. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WILSON, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented new and useful Improvements in Automatic Electric Train Signals and Controlling Devices, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in automatic electric train signals and controlling devices for the purpose of preventing trains in block systems from coming too near each other, and thus preventing accidents caused by one train running into another one ahead of it on the same track, and for this purpose I make use of devices constructed and arranged as follows, reference being had to the accompanying drawings, wherein—

Figure 1 represents a perspective view showing the general arrangement and location of parts composing the invention. Fig. 2 represents a partial side elevation of a locomotive, showing the improved valve-releasing device for automatically letting off the steam from the boiler and setting the vacuum or other brake. Fig. 3 represents a transverse section of the engine-cab, showing the valve-releasing device in end elevation. Fig. 4 represents a detail plan view of said valve-releasing device, part of which is shown in section. Fig. 5 represents a detail perspective view of the tripping device for automatically actuating the valve-releasing device above mentioned on a locomotive or motor running onto the guarded portion of the block system, and thus arresting such motor, locomotive, or train, to enable the driver to ascertain the cause of the obstruction. Fig. 6 represents detail parts of said tripping device. Fig. 7 represents a detail view of the rock-lever and shaft for operating the said tripping device mechanically, and Fig. 8 represents a detail perspective view of the trip-lever and locking-bolt on the valve-releasing device.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

a a represent the rails of a railroad-track, as usual, and B represents a locomotive or motor, on which *b* is the boiler.

In addition to the valve-releasing device on the motor, which will hereinafter be described, I use a tripping device C, a battery D, and a circuit-closer E, electrically connected, constructed, and arranged as follows: The tripping device C is arranged in a suitable manner outside of one of the rails and in close proximity thereto, as shown in Figs. 1 and 5, and it is constructed as follows: It is composed of a base *c*, on which is mounted the electro-magnet c' c', having ground-wire x and battery-wire x' leading to the battery D, as shown in Fig. 1. Above the electro-magnet is pivoted at c'' the armature-lever c^3, having armature c^4 secured to it as shown in Fig. 5. The said armature-lever is automatically raised from the electro-magnet, when the current through the battery D is broken by the influence of a spring c^5. (Shown in Fig. 5.) The free end of the armature-lever c^3 is limited in its vibration in a frame c^6, provided with the usual adjustable regulating-screws, similar to those used on Morse's electric sounders.

To the base-plate *c* is secured the frame c^7 in bearings, in which is journaled the shaft c^8, provided in its upper end with a railway-signal c^9 of any well-known form or construction, as shown in Figs. 1 and 5.

To the shaft c^8 is secured the lever c^{10}, having preferably in one end a head c^{12}, as shown in Fig. 5. When the track is clear, the lever c^{10} is normally held by the influence of a spring c^{13} in the position shown in dotted lines in said Fig. 5. When a motor or train passes by the place near the above-mentioned tripping device, the wheel-flanges pass over and depress a lever C′ close to the rail *a*, as shown in Fig. 5. Said lever is attached to a shaft C″, located in suitable stationary bearings and provided in its inner end with a segmental gear C^3, the teeth of which mesh into the teeth of the pinion C^4, secured to the vertical shaft c^8, as shown in Fig. 6. By this arrangement the lever C′ is depressed when the wheels of a motor or train pass over it, causing the shaft C″ to be rocked and the

lever c^{10} and signal c^9 to be turned against the influence of the spring c^{13} to the position shown in full lines in Fig. 5, in which position it is locked by the end of the armature-lever c^3, serving as a stop against the said lever c^{10}, as shown in full lines in Fig. 5.

C^5 is a stop-pin or projection on the frame c^7, which prevents the lever c^{10} from being turned farther than at a right angle, or nearly so, to the rail a.

The full lines of the lever c^{10} in Fig. 5 indicate "danger" and show to the engineer that a train has passed by the tripping device in the guarded block and has not passed by the circuit-closer E, which latter may be arranged a mile or so from the tripping device C, according to the desired distance in the block system.

The circuit-closer E is made of any well-known form, the one shown in Fig. 1 being composed of a lever e, having its end arranged inside of the rail a, so that the wheel-flanges of the train or motor will depress it. The said lever is pivoted at e', and beyond said fulcrum the lever is made to rest against the lower end of a spring-pressed rod e'', provided with a metallic electrode e^3, connected to the ground-wire x'', as shown in Fig. 1. As the lever e is depressed, the electrode e^3 is brought in metallic connection with the metallic electrode e^4, that is connected by means of the wire x^3 to the battery D. It will thus be seen that when the train passes by the lever e at the end of the block in the system the current through battery D will be closed, causing the armature-lever c^3 to be attracted toward the electro-magnet c' c' in the tripping device, by which the lever c^{10} is liberated and swung by the influence of its spring c^{13} to the "no-danger" position indicated by dotted lines in Fig. 5, showing to the driver of a train following that the block in the system is clear.

In connection with the lever c^{10} and its head c^{12}, I use a valve-releasing device on the locomotive or motor, which is constructed as follows: On a suitable frame or bracket b' on said motor is pivoted at b'' the tripping-lever b^8, the inner end of which is connected to a link b^4, which is connected to a spring-pressed locking-bolt b^5, the end of which is adapted to enter a perforation in the releasing-bar b^6, as shown in Fig. 8. The said valve-releasing bar b^6 is normally held in position (shown in Fig. 2) by the influence of a suitable spring b^7. The end of the bar b^6 nearest the cab B' of the motor B is connected to a hand-lever b^8, that is pivoted in its lower end in any suitable manner to the cab or its connections. A link b^9 is connected to the lever b^8, and said link is attached to a cock-valve or cut-off b^{10} on the steam-let-off pipe b^{12}, leading from the boiler b, as shown in Figs. 2 and 3. The steam-let-off pipe b^{12} is connected to a small cylinder b^{13}, in which is arranged the piston b^{14}, normally held in the position within the cylinder b^{13}, as shown in Fig. 4.

b^{15} is an escape-pipe leading from the cylinder b^{13}, said pipe being the usual vacuum-pipe employed in the "Ames" or other well-known vacuum-brake devices, by which such automatic brakes are operated by the liberation of the steam from the boiler, and I wish to state that I do not confine myself to any particular mechanism or device for operating the brakes, it being only necessary that the same shall be effected automatically by the tripping-lever on the motor, as described. The piston b^{14} has its stem connected to the usual throttle-lever b^{17}, pivoted at b^{18} for the purpose of returning the piston b^{14} to its normal position (shown in Fig. 4) after it has been acted on by the steam from the pipe b^{12}.

To the throttle-lever b^{17} is pivoted the usual throttle-valve rod b^{16}, by which the steam-supply to the cylinders is regulated as usual.

The operation of the said valve-releasing device is as follows: If a train or motor is on the track in the "block" between the tripping device C and circuit-closer E, the lever c^{10} on the tripping device will be held in the position shown in full lines in Fig. 5, indicating "danger." Should a locomotive or motor provided with my valve-releasing device now advance beyond the tripping device C, the head c^{12} on the lever c^{10} will come in contact with the pivoted lever b^8 on the motor and swing the latter to one side, as shown in dotted lines in Fig. 8, causing the bolt b^5 to be released from the spring-pressed bar b^6, which latter is then liberated and moved by the influence of its spring b^7 in the direction shown by arrow in Fig. 2, causing the valve b^{10} to be turned, by which the steam in the boiler is allowed to escape into the cylinder b^{13} against the piston b^{14}, which latter is thereby forced forward and beyond the exit and vacuum pipe b^{15}, thus allowing the steam from the boiler to escape through cylinder b^{13} and pipe b^{15}, thus reducing the pressure in the boiler at the same time as a vacuum is produced in the brake mechanism, by which such brake mechanism is automatically operated for putting on the brakes. At or about the same time as the steam is let off from the boiler and the vacuum-brake operated as above mentioned, the throttle-valve rod b^{16} is operated, causing the steam from the boiler to be automatically cut off from the cylinders. It will thus be seen that the motor is automatically arrested independently of the action of the driver or man in charge in case it should happen to enter the guarded block when such block is occupied by a train or motor.

In the drawings the device has been shown as applied to a steam-motor; but the invention is equally well adapted for electric or other motors of any well-known form or make without departing from the essence of my invention.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. In a train signal and controlling device,

the combination of a vertical signal-shaft having a spring-controlled lever movable in a horizontal plane, an electro-magnet having an armature and arranged in an open circuit including a battery and a circuit-closer, a lever operated by the train for moving the signal-shaft, a lever operated by the train for moving the circuit-closer to close the circuit, a motor having at one side a horizontally-swinging trip-lever, a releasing-bar on the motor, and means for connecting the trip-lever with the releasing-bar, substantially as described.

2. In a train signal and controlling device, the combination of a vertical signal-shaft having a spring-controlled lever movable in a horizontal plane, an electro-magnet having an armature and arranged in an open circuit including a battery and a circuit-closer, a lever operated by the train and connected with and serving to rotate the signal-shaft, a lever operated by the train for moving the circuit-closer to close the circuit, a locomotive having at one side a horizontally-swinging trip-lever adapted to be swung by the spring-controlled lever on the signal-shaft, a steam-cut-off valve for the boiler of the locomotive, a releasing-bar connected with the valve, and means for detachably connecting the trip-lever with the releasing-bar, substantially as described.

3. The combination, with a signal-shaft having a lever movable in a horizontal plane, of a locomotive having at one side a flexible arm which is movable in a horizontal plane and arranged to be struck and moved by the lever on the signal-shaft, a steam-cut-off valve for the boiler of the locomotive, a spring-controlled releasing-bar connected with the valve, a locking-bolt engaging said releasing-bar and disengaged therefrom by the movement of said flexible arm, and a lever for resetting the valve-releasing bar, substantially as described.

4. In a train signal and controlling device, the combination, with a lever c^{10} beside the track, of a locomotive, the cylinder b^{13}, having a pipe b^{12} leading to the boiler and provided with a steam cut-off valve, a valve-releasing bar b^{6}, a flexible arm b^{3}, arranged on the locomotive and adapted to be moved by the lever beside the track, and a locking device engaging the said releasing-bar and disengaged therefrom by the movement of the said flexible arm, substantially as described.

5. In a train signal and controlling device, the combination, with a vertical signal-shaft having a lever which is movable in a horizontal plane, of electro-magnetic mechanism for holding and releasing said lever, a motor moving on the track and having a horizontally-movable trip-arm adapted to be struck and moved by the lever on the signal-shaft, and a brake-setting mechanism thrown into effective operation when the trip-arm is struck by the lever on the signal-shaft, substantially as described.

6. In a train signal and controlling device, the combination of a vertical signal-shaft having a lever which is movable in a horizontal plane, a lever connected with the signal-shaft and operated by the train to rotate the latter, electro-magnetic mechanism including an open circuit and a circuit-closer and serving to hold and release the lever on the signal-shaft, a lever operated by the train to move said circuit-closer and close the circuit for releasing the lever on the signal-shaft, a motor having at one side a horizontally-movable trip-arm adapted to be struck and moved by the lever on the signal-shaft when the said lever is held by the electro-magnetic mechanism, and brake-setting mechanism thrown into effective operation when the trip-arm is moved by the lever on the signal-shaft, substantially as described.

7. In a train signal and controlling device, the combination of a signal-shaft having a lever which moves in a horizontal plane, a lever beside the track operated by the train to rotate the signal-shaft, electro-magnetic mechanism including an open circuit and a circuit-closer for holding and releasing the lever on the signal-shaft, a lever operated by the train to move the circuit-closer and close the circuit for releasing the lever on the signal-shaft, a locomotive having at one side a flexible trip-arm movable in a horizontal plane and adapted to be struck and moved by the lever on the signal-shaft when said lever is held by the electro-magnetic mechanism, a steam-cut-off valve for the boiler of the locomotive, a releasing-bar connected with the valve, a locking-bolt engaging the releasing-bar and disengaged therefrom by the movement of the flexible trip-arm, and a lever for resetting the releasing-bar, substantially as described.

8. The combination, with a lever c^{10} beside the track, of a motor moving on the track and provided with a pivoted horizontally-swinging trip-arm b^{3}, adapted to be swung by the said lever, the spring-pressed releasing-bar b^{6}, the spring-locking bolt b^{5}, connected with the trip-arm, engaging the releasing-bar and disengaged therefrom by the movement of the trip-arm, and a resetting-lever b^{8} for the re-releasing-bar, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 12th day of July, A. D. 1889.

WILLIAM H. WILSON.

Witnesses:

ALBAN ANDRÉN,

MATTIE J. JACKSON.