

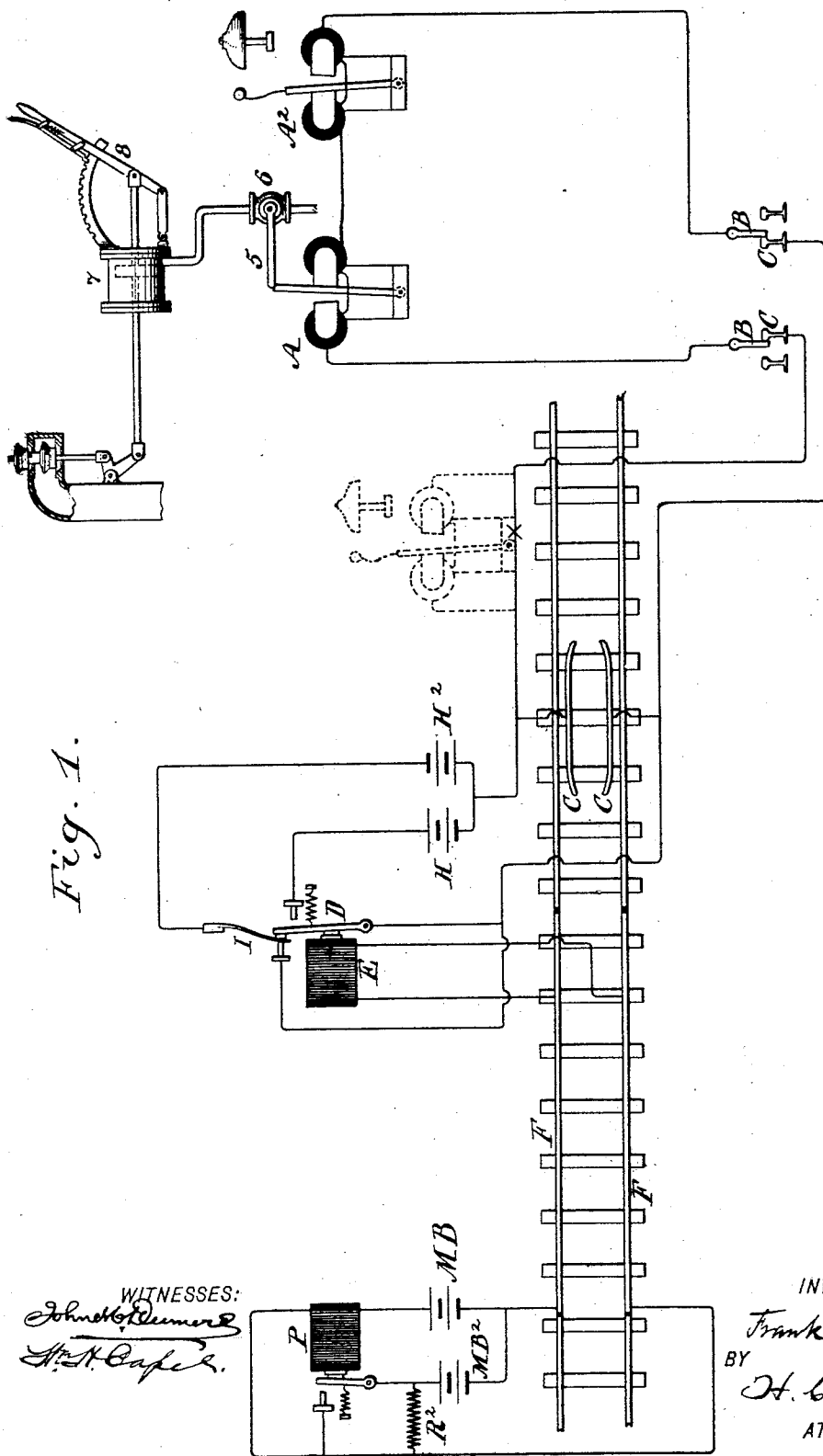
(No Model.)

F. E. KINSMAN.
RAILWAY SIGNAL DEVICE.

3 Sheets—Sheet 1.

No. 520,061.

Patented May 22, 1894.



WITNESSES:
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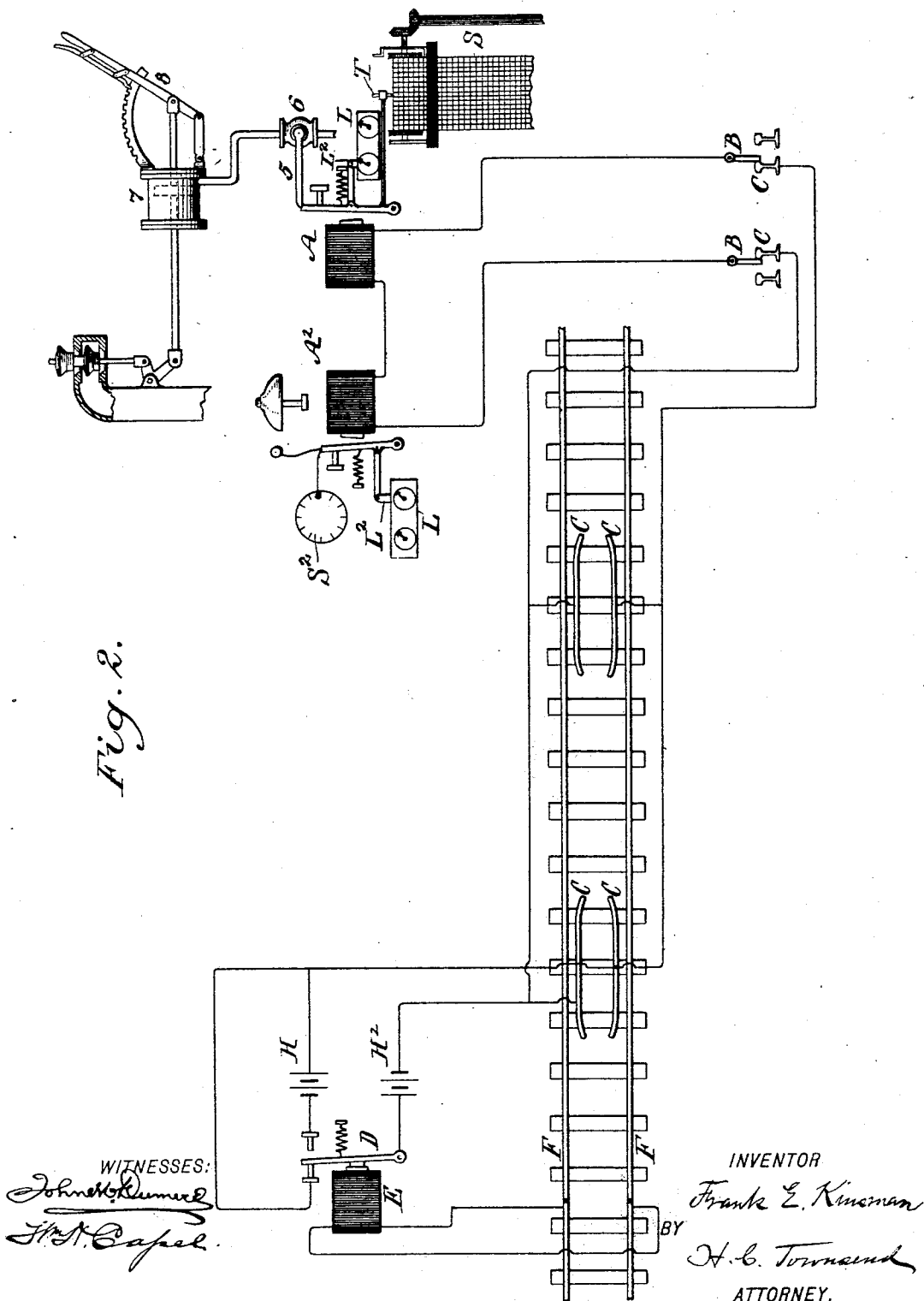
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3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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Fig. 3.

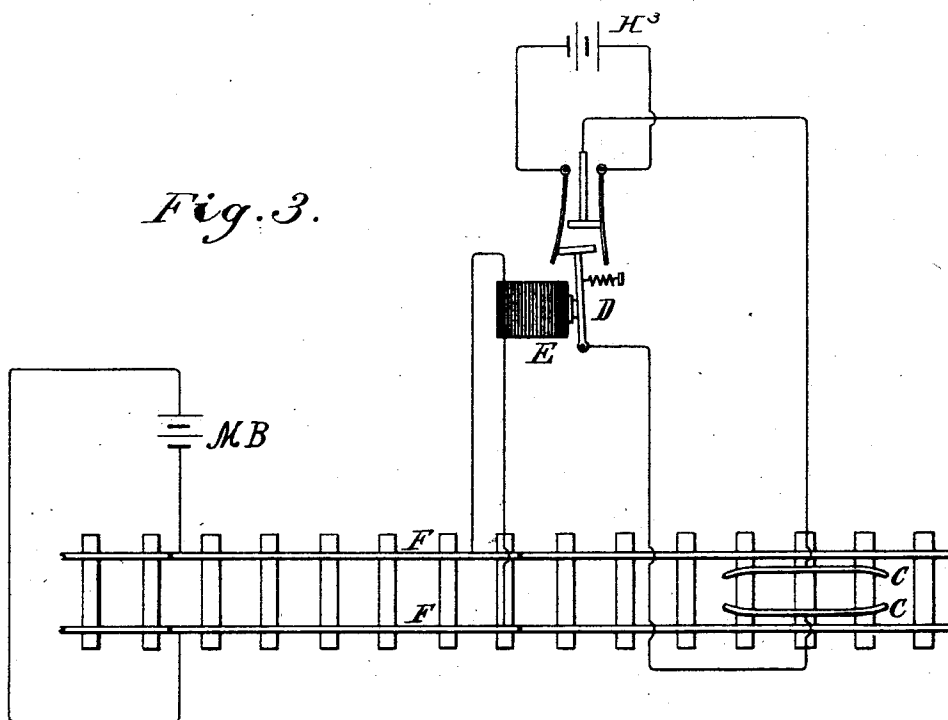
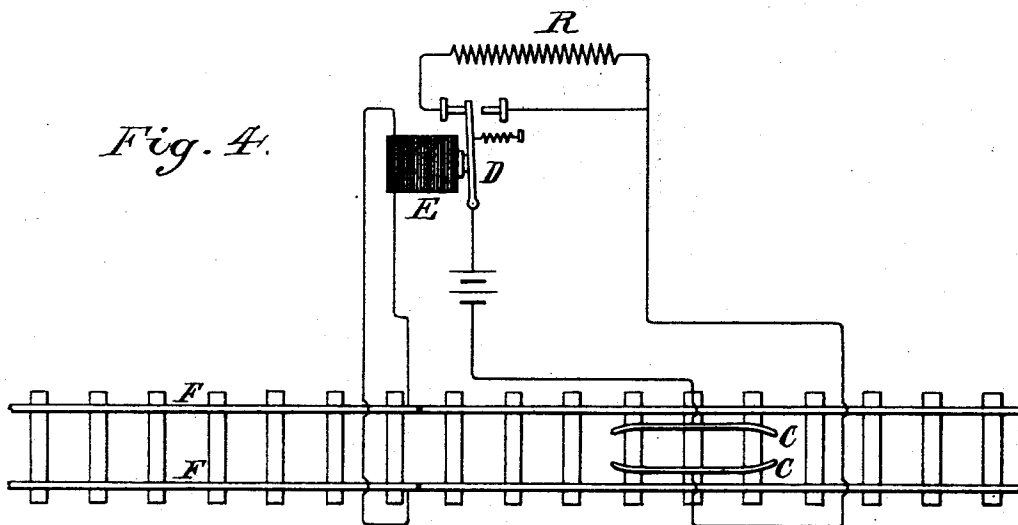


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK E. KINSMAN, OF PLAINFIELD, NEW JERSEY.

RAILWAY SIGNAL DEVICE.

SPECIFICATION forming part of Letters Patent No. 520,061, dated May 22, 1894.

Application filed February 1, 1893. Serial No. 460,562. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. KINSMAN, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Railway Signal Devices, of which the following is a specification.

My invention relates to that class of apparatus in which means are provided for automatically cutting off or reversing the motive power, applying the brakes, or otherwise bringing a locomotive or other vehicle to rest when the same passes a prescribed point on the road bed and traffic or other conditions may require a stop in order to avoid collision or other mishap.

The object of the invention is to give notice to the locomotive engineer, or other driver, that the controlling apparatus or circuits on the line or road are in normal or safety condition at the time that the locomotive passes the point where otherwise, should conditions require it, the locomotive would be automatically stopped.

My invention consists essentially in the combination of an electric signal suitable for giving notice to the engineer that the controlling apparatus or circuits along the line are in safety or normal position, and a controlling magnet for the stopping apparatus inefficient or unresponsive under the action of the current used in operating said signal.

In carrying out my invention said controller magnet might be a polar magnet and the signal current be one of such polarity as not to disturb or act on the controlling magnet in the manner required or employed when danger conditions arise, or the controlling magnet might be adjusted to respond only to tension of current increased over that used in signaling the engineer that safety conditions exist in the apparatus. It will also be obvious to electricians that other ways of accomplishing the result might be used, as, for instance, by using a vibratory current of high rate for signaling the engineer by sound, touch or sight and using a controlling magnet of such character that it would respond only to a substantially uniform current.

By use of my invention it will be obvious that the engineer may drive his engine with greater confidence past points where an auto-

matic stop is liable to occur, since the signal gives him positive information that he may proceed safely, whereas, without the use of such signal he could not be sure that the absence of action by the automatic stopping apparatus was not due to failure or defect of some part either on the locomotive or the line.

My invention consists further in the special combinations of apparatus herein described and then specified in the claims.

In the accompanying drawings:—Figure 1, is a diagram illustrating one form of my invention. Fig. 2, is a modification. Figs. 3 and 4, are further modifications.

The invention is herein shown as carried out in connection with a form of automatic stopping apparatus invented by me in which the throttle or power controller, the reversing gear or the brakes are operated through the action of a piston the pressure in whose cylinder is controlled by an electro-magnet on the locomotive and in a circuit thereon but the present invention completed through contact bars on the road bed is adapted for use when other stopping apparatus is used or when the magnet is otherwise arranged. It is to be understood, however, that I do not limit my invention to automatic stopping apparatus brought into action by mechanism of the kind just referred to, nor to automatic stopping mechanism controlled by an electro-magnet on the locomotive, the invention consisting broadly in the combination of an electric signal, operated under the conditions hereinafter described, with any controlling magnet or circuit which acts automatically in the control or operation of suitable automatic devices for bringing the train to rest without the intervention of the engineer or driver.

A, is the controlling magnet for the automatic stopping apparatus. The magnet is preferably arranged in a circuit from two contact arms B, B, carried by the vehicle and adapted to rub against two contact rails C, C, on the road bed in any suitable manner, but preferably in the manner described in my Patent No. 470,806, granted March 15, 1892. The condition of the circuit connected to the rails C, C, determines the action of the magnet, the general operation, as well understood in the art, being to energize the magnet to

stop the train passing over them whenever the circuit controllers, switches or circuit closers or other devices connected to C, C, are in position corresponding to what, for brevity, may be termed danger conditions or condition of the track ahead requiring the locomotive to come to rest. The circuit controller here shown consists simply of a circuit closer D, actuated as the armature of an electro-magnet E, which is connected to the rails F, of a section of track and on normally closed circuit with said rails and a battery connected to the opposite end of the section, so that on breakage of the rail section or short circuiting of magnet E, by a train on the section, thus producing a danger condition, the circuit closer may operate to bring the controller magnet A, into action when contacts B, B, reaches the rails C, C. As shown, this occurs by the magnet E, losing its power and allowing the circuit closer to close the circuit of a battery H, connected to the contact rails. When normal or safety conditions prevail the circuit is open and the magnet A, would not be effected when passing the contact rails. As well understood in the art D and E, might be each otherwise constructed and operated under other circumstances requiring the vehicle to be automatically stopped.

As indicated, electro-magnet A, is a polarized magnet so that its armature will be moved from the position shown or normal position, only by a current of the polarity sent by battery or other generator H, and the armature will remain in the position shown if a current of opposite polarity is sent through the circuit containing said magnet. Any form of polarized magnet might be used for the purpose, its armature being arranged to control the operation of the automatic stopping devices for the vehicle. It is shown as controlling a form of automatic stopping devices invented by me, though other forms might be employed.

The armature of the magnet operates to detain an arm 5, projecting from a cock or valve 6, which in turn controls the pressure in a cylinder 7, the piston of which latter connects with the throttle valve as indicated. The throttle may be the same throttle as is operated by the hand lever 8, in the locomotive cab. In the form here shown said handle and the piston rod are connected by a clutch, as described in my Patent No. 492,402, granted February 28, 1893, to permit the throttle to be operated automatically without moving the handle 8, and to allow the throttle to be opened by means of the handle 8, through the action of the clutches.

As any means for bringing the train or vehicle to a stop by governing the motive power or action of the brakes may be employed without departing from my present invention, the devices for this purpose will not be more particularly herein described.

A², is an electric signal which is here shown as an electric bell, but might be of any other

character for giving notice to the engineer by sound, touch, sight or other source, as well understood by electricians. The electro-magnet for this bell is in circuit with the magnet A, preferably on the locomotive, so as to be near the engineer, though it might be interposed in a part of the circuit upon the road bed that is completed when the locomotive passes the contact rails C. Thus, for instance, it might be placed at the point X, in the circuit connected to the rails C, and in proper position to be heard or seen by the engineer as the locomotive passes it.

While any other electric signaling device adapted to give notice to the engineer might be employed in its place and in any proper location, I prefer to use an audible signal.

The electro-magnet A², might be a polarized electro-magnet, as shown, or might be a neutral magnet, the only difference being that in the latter case it would respond both when the signal is given that the apparatus is in normal condition and when the magnet A, is operated for the purpose of stopping the locomotive. The polarity of current employed for operating the magnet A², is opposite that which is required in operating the magnet A. In other words if magnet A², is polarized it should be wound or connected in such way that A, and A², will respond respectively to currents of opposite polarity only.

The magnet A², is supposed to operate when the locomotive passes the contact rails C, C, and the signaling current sent for this purpose is controlled by some part of the apparatus in such manner that the said signaling current will be sent when the apparatus is in normal or safety position. For this purpose the lever D, may operate upon a circuit closer indicated at I, whereby the circuit of a battery H², connected to the contact rails C, C, will be closed so long as the lever D, remains attracted by the magnet E. The battery H², is of opposite polarity to H, so that when the locomotive passes the contact rails C, the current will flow from said battery H², through magnets A and A², but the former of said magnets will not be effected while the latter will give the signal to the engineer indicating that the apparatus which automatically controls the movement of the locomotive is in normal or safety position. If the lever D, is in retracted position which is, with the apparatus, a danger position requiring the locomotive to stop, then battery H², will be cut out and battery H, be connected to the contact rails so that when the locomotive passes the rails C, a current of the opposite polarity will be caused to flow through the circuit of magnets A and A², and the magnet A, will respond and bring into operation the automatic stopping devices on the locomotive, while magnet A², will either remain quiet or respond according as it is a polar or a neutral magnet. As it is only necessary, however, that the signal notifying the engineer of the safety or normal condition of the apparatus

or circuits should be given by a current which will not act on the magnet A, it is obviously not absolutely necessary that the magnet A², should fail to respond when the magnet A, operates. The devices for closing the circuit whereby magnet A, is operated when the locomotive passes a given point on the track, are here shown as constructed to close the circuit by rubbing or side contact of an arm B, with a rail C, but any other circuit closing devices for bringing the magnet A, into operation when the locomotive is to be stopped might be employed in place thereof without departing from the invention.

In Fig. 2, I have shown a modification of the invention wherein the signal is given by means of a current of less tension than that which is required to bring the automatic stopping apparatus into action. In this instance it is obvious that a non-polar controlling magnet for the stopping apparatus would be employed as indicated at A. The signal magnet A², is here also shown as the neutral magnet which would respond to the current used in operating magnet A. The controller lever D, as in the former case is shown as operated by a magnet E, but might be operated by any other device. In the normal or safety condition of the apparatus it closes the circuit of the battery H², and a current from said battery will flow through magnets A², and A, when the contact arms B, B, complete circuit for the strength of current produced by battery H², is insufficient to actuate magnet A, whose retractor is properly adjusted for such purpose although magnet A², will respond.

When the armature lever D, moves against its back contact, it throws the battery H, into circuit with H², as indicated, thus producing an increased current of sufficient strength to actuate magnet A, when the arms B, complete the circuit of said magnet. The automatic stopping apparatus will, by the action of magnet A, be thereby brought into operation, the lever D, being, in the case supposed, in the danger position or condition required in order that the locomotive should be automatically stopped.

Many other modifications of the invention will suggest themselves to electricians. Thus, for instance, as indicated in Fig. 3, the lever D, or similar device whose position determines the action of magnets A and A², might operate upon a pole changing device controlling the circuit of the battery H³, the battery and pole changer being so connected that while the lever D, stands in the normal or safety position, the battery H³, would be connected to the rails C, in such manner that the magnet A², Fig. 1, will be affected when the locomotive passes such rails, but magnet A, being properly polarized, will not respond to the current of said battery. When the lever D, is changed to the danger position, then the connections of the battery H³, with the rails C, would be reversed so that the cur-

rent taken up by arms B, of the locomotive or other vehicle from the rails C, will flow in the opposite direction or in a way to affect the magnet A, and automatically stop the locomotive.

It will be obvious that my invention is applicable not only to the case of a locomotive driven by steam, but to motors and cars driven by any other power, the action of which power is controlled in any proper manner by an electro-magnet operating in the manner of magnet A.

While I have shown in Fig. 2, a method of controlling the tension of the current so as to produce the different tensions required, it will be obvious to electricians that instead of throwing in and out of circuit an additional generator, an artificial resistance might be controlled in the same manner, the lever D, being made, when in one position, to complete the circuit of said resistance through the generator, and in the other position to throw said resistance out of circuit, as indicated in Fig. 4, where R, indicates the artificial resistance. As before stated, however, my invention is not confined to any particular manner of producing the different electrical conditions necessary for operating the signal magnet when the apparatus is in safety condition or position and bringing the controlling magnet of the automatic stopping apparatus into operation either alone or in addition to the signal device only when the danger condition exists in the controlling apparatus or circuits.

In Fig. 1, of the drawings I have shown in addition to the battery M, B, which normally charges the section of rails F, an auxiliary or relay battery M, B², which is normally out of circuit being kept out of circuit by the magnet P, which is in circuit with M, B. If the battery M, B, should fail, however, the magnet P, loses its power and will permit its armature lever to drop back and connect the battery M, B², to the circuit F, thus maintaining the potential of said circuit. As I prefer to employ gravity batteries, I propose to use in connection with the battery M, B², a normally closed shunt of high resistance to keep said battery in working order. For this purpose I provide an artificial resistance R², which normally completes the circuit of said battery, as shown, but which is of such resistance as not to interfere with the normal working either of battery M, B, or M, B², when the latter is connected to the rails F, F.

The reserve battery employed and combined as described and shown is not herein broadly claimed as it forms the subject of claims in another application for patent filed by me of even date herewith, Serial No. 460,561.

The apparatus shown herein and in my prior applications for patent and patents for automatically bringing a vehicle to rest by cutting off or reversing the motive power or applying the brakes, might be used as the sole means for controlling the progress of the

train, but under ordinary circumstances and as set out in another application for patent filed by me of even date herewith, Serial No. 460,563, I design to employ my apparatus for bringing a train to rest without the intervention of the locomotive driver in connection with any suitable system of block signal apparatus wherein semaphore disks or brackets are placed opposite the track in view of the engineer and inform him of the condition of the track ahead so that he, not finding the semaphore at danger or against him, may bring his train to rest until the restoration of the semaphore to safety position may give him notice that he may proceed without danger.

As the knowledge on the part of the engineer that the automatic stopping devices are present on the line over which he is running might tend to destroy a proper sense of responsibility so that he might be tempted to wilfully hold the automatic devices from operation when approaching a semaphore in order that he might run by the same when he is trying to make time, or when he thinks that he could bring his train to rest when he sees the track ahead of him occupied, and as it is not the purpose of my invention to relieve the engineer of all responsibility, I propose to combine with the apparatus already described a proper registering apparatus suitably locked or inclosed so that the engineer may not tamper with it and properly organized to make a registry of each closure of circuit produced by the arms B, B, or of other electrical action which is attendant upon the operation of the devices used for automatically bringing the train to rest. By this means a check is put on the engineer to prevent him from wilfully holding the devices out of operation or from falsely claiming, in the event of accident, that the signals were not set against him or that the devices did not respond to a danger condition. I also propose to combine a suitable registering device with that part of the circuits or apparatus which responds when the locomotive passes a prescribed point and notifies the engineer that the apparatus is in normal position or condition. Some of the means that may be used for carrying out this part of my invention are indicated in Fig. 2, from which the manner of applying them to other parts of the circuits or apparatus, as may be desired, or to other apparatus operated in proper manner to effect the same result of automatically stopping the train or vehicle, or giving a visual or other signal to the engineer in case of danger, will be readily understood. In this figure L, indicates a mechanical register or counter, the operating lever of the same being indicated at L², and mechanically connected with any device will respond whenever the magnet A, operates, thus keeping a registry of the operations of the circuit by which the action of said magnet is controlled. The parts of the counter are properly inclosed

and locked against interference by the engineer. As here shown the lever L², is connected by a link or other mechanical device to the lever of the armature for magnet A. The same device might be employed in connection with the signal side of the apparatus by attachment to the armature lever of magnet A², or by other means as indicated.

Instead of using a counter of the various operations it will be obvious that a registry might be kept by marking, indenting or making other indications upon a traveling sheet of paper or other material indicated in Fig. 2, at S, which sheet would be mounted upon suitable rollers, as indicated, and kept in movement by any suitable mechanism, preferably a time mechanism, which would show the exact time of operation of the safety devices. The recording pencil or marker indicated at T, might be connected as shown with the armature lever of A, so as to make a spur on the straight line which is described by said pencil or marker while the armature of A, is at rest. Instead of operating upon the traveling sheet of paper moved by rolls, the said marker might operate upon the face of a disk S², divided off like the sheet S, into hours and minutes and turned by suitable clock work, as indicated in connection with the magnet A², where a device for keeping a registry of the safety indications by marks, is indicated. It will be obvious that this part of my invention is applicable not alone to apparatus which operates to stop the train, without the intervention of the engineer or driver, but also to the pure semaphore systems wherein semaphore disks or arms are located beside the track for the purpose of giving the locomotive engineer warning of the condition of the track ahead, thereby enabling him to control the movement of the train to avoid collisions.

What I claim as my invention is—

1. In an apparatus for automatically bringing a railway car or vehicle to rest, the combination, substantially as described, of an electric signal for notifying the engineer or driver that the apparatus is in normal position or condition, and a controlling magnet for the stopping devices, inefficient under the action of current used in operating said electric signal.

2. In an apparatus for automatically stopping railway cars or vehicles, the combination, substantially as described, of an electric signal magnet on the locomotive, a polarized controlling magnet for the stopping apparatus also on the locomotive in circuit with the former, means for sending a current of one polarity when the apparatus or circuits are in safety position, and means for sending a current of the opposite polarity proper for operating the magnet of the stopping devices when the controlling apparatus on the line is in danger position.

3. The combination, substantially as described, with apparatus for automatically

bringing a train to rest, of a polar controlling magnet therefor on a vehicle of the train, circuit closing devices carried by the vehicle and connected with said magnet for completing the circuit thereof when passing a certain point on the road-bed, an electric signal in the circuit that is completed, and means controlled by the apparatus on the line when in safety position for sending a current over said completed circuit to operate the signal, said current being of proper character, as described, not to affect the polar magnet.

4. The combination, substantially as described, in an apparatus for controlling the movement of railway trains, of a polar electromagnet A, controlling the stopping apparatus, a second magnet A², for giving a signal both in circuit with one another on the locomotive or other vehicle, a contact arm or arms B, B, carried by the vehicle, a contact rail or rails C, C, on the road bed, and means for connecting a generator with one polarity or the other as required to said rails, as and for the purpose described.

5. The combination with the main battery M, B, of an auxiliary or reserve battery M, B², means for throwing said reserve battery into connection on failure of the first named battery, and an artificial resistance through which a circuit of the reserve battery is normally completed, as and for the purpose described.

6. In an apparatus for automatically bringing a railway car or vehicle to rest, the combination of an electric signal for notifying the engineer or driver that the apparatus is in normal position or condition, a controlling magnet for the stopping device, inefficient under the action of the current used in operating said electric signal, and means for registering each operation of said controlling magnet, as and for the purpose described.

7. The combination in an apparatus for automatically bringing a railway car or vehicle to rest, of an electric signal for notifying the engineer or driver that the apparatus is in normal position or condition, a controlling magnet for the stopping device, inefficient under the action of the current used in operating

said electric signal and means for registering each operation of the electric signal.

8. The combination in an apparatus for automatically stopping railway cars or vehicles, and without the intervention of the engineer, of an electric signal on the road bed for giving notice to the engineer that the apparatus is in normal position or condition when he passes a prescribed point, and a controlling magnet for said apparatus inefficient under the action of the current used in operating said electric signal.

9. In an apparatus for controlling the movement of vehicles by bringing the same to rest automatically without the intervention of the engineer, the combination with said apparatus, of a controller magnet, and an electric signal for indicating safety condition of the apparatus, said signal being responsive to the current to which the controller magnet is unresponsive, and means for registering the operation of the controlling magnet and the signal.

10. The combination, substantially as described, with a locomotive or other vehicle, of a magnet A, thereon, controlling the devices for bringing the vehicle to rest without the intervention of the engineer, a signal magnet A², responsive to a current to which the magnet A, is unresponsive, and means for registering the operations of either or both of said magnets.

11. In an apparatus for controlling the movement of railway trains, the combination, substantially as described, with means for stopping the vehicle without the intervention of the engineer, of the controller magnet A, on the locomotive, and a signal magnet A², also on the locomotive and both connected to suitable contact arms carried thereby, and means for sending a signal to operate the magnet A², without operating the magnet A.

Signed at New York, in the county of New York and State of New York, this 10th day of January, A. D. 1893.

FRANK E. KINSMAN.

Witnesses:

WM. H. CAPEL,
THOS. F. CONREY.