

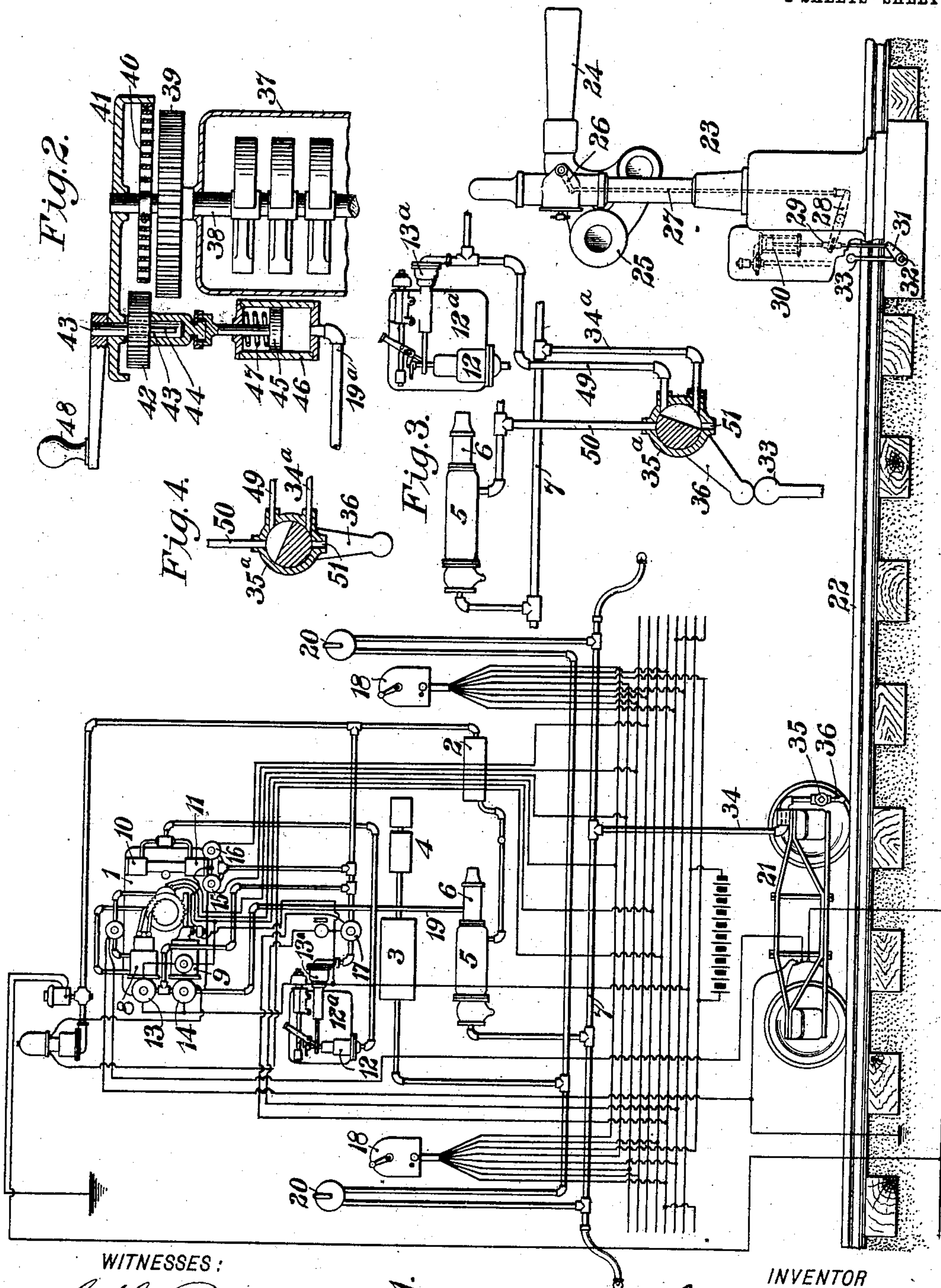
G. GIBBS.

CONTROLLING SYSTEM FOR RAILWAY VEHICLES OR TRAINS.

APPLICATION FILED APR. 11, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

C. L. Belcher  
B. B. Hines

Fig. 1.

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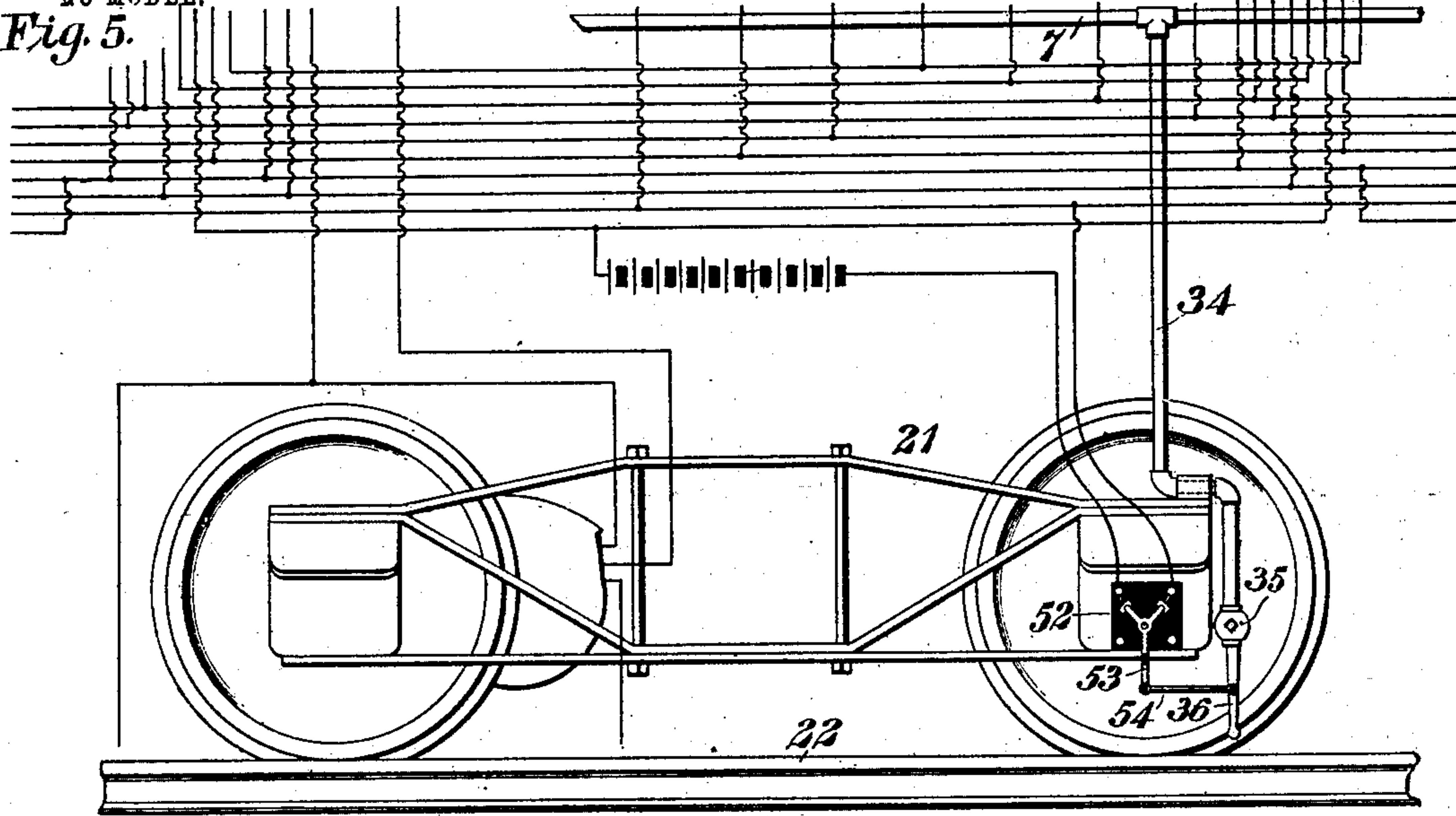
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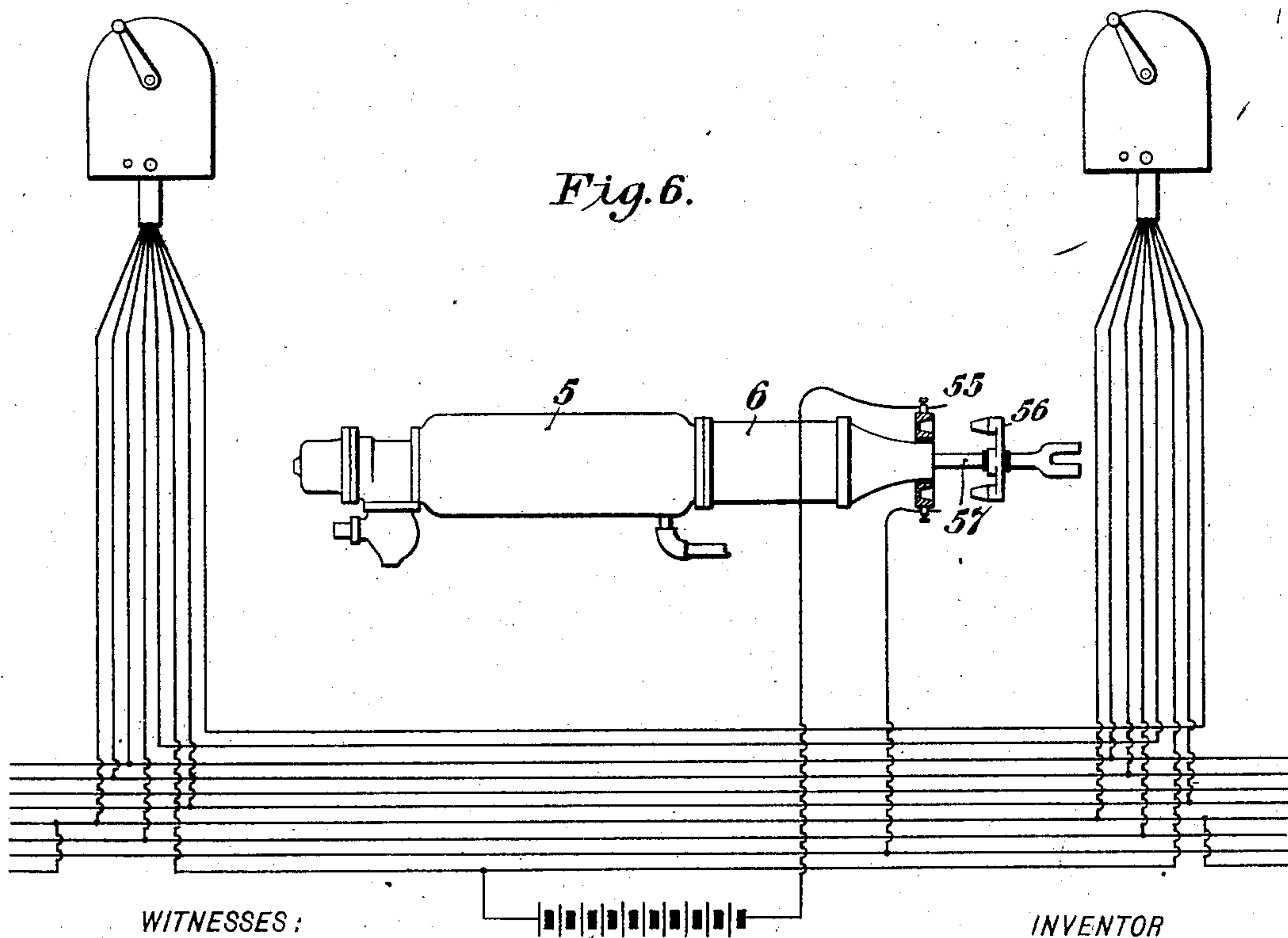
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NO MODEL.  
*Fig. 5.*

2 SHEETS—SHEET 2.



*Fig. 6.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

GEORGE GIBBS, OF NEW YORK, N. Y.

## CONTROLLING SYSTEM FOR RAILWAY VEHICLES OR TRAINS.

SPECIFICATION forming part of Letters Patent No. 724,690, dated April 7, 1903.

Application filed April 11, 1902. Serial No. 102,409. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE GIBBS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Controlling Systems for Railway Vehicles or Trains, of which the following is a specification.

My invention relates to controlling systems for railway-vehicles and trains of vehicles, and particularly to vehicles or trains equipped with electric motors for propelling and with air-brakes for retarding and stopping the same.

One of the objects of my invention is to provide means whereby the setting of the air-brakes either automatically or by the operation of the engineer's valve shall serve to break the power-circuit by effecting the return of either a hand-operated main controller or the master-controller of the system to "off" position.

A further object of my invention is to provide means whereby the power-circuit may be automatically broken by any suitable means and at any desired point when any danger-signal of the system is overrun by the vehicle or train.

Railroads equipped with trains operated by steam-engines are usually divided into sections or blocks, each of which is provided with a signal which indicates the presence of an engine or a train upon that portion of the track included in the block which is immediately ahead of the signal, and some of the modern railroads which are electrically equipped, particularly underground and elevated roads upon which trains of vehicles are operated, are provided with such signal systems as that above mentioned. It follows as a matter of course from the character of electrically-equipped urban roads that the blocks or sections are of comparatively short length and that trains run at frequent intervals. Such being the case, there is always more or less danger by reason of possible carelessness upon the part of the motorman or from other causes of overrunning the signals. I propose to prevent all possible danger by reason of such overrunning of signals by providing a means which shall automatically act to apply the air-brakes of any train which overruns a sig-

nal, and at the same time to interrupt the power-circuit used for operating the car or train. This latter feature is an important adjunct, since if the brakes are applied without cutting off the power the propelling force of the motors is exerted against the action of the brake-shoes, thus preventing a prompt stop and causing excessive strains and probable injury to the car mechanism and equipment.

My invention may be employed in connection with any one of a variety of controlling systems, and it may also be utilized to effect the return of either the main controller or controllers of the system or the master-controller to zero or off position, or it may be made to interrupt the power-circuit by any one of a variety of means at any desired point in the circuit.

My invention may be also utilized in connection with a single vehicle and its operating and controlling system; but its most important application will be in connection with trains of vehicles propelled by motors on a plurality of the cars comprised in the train, all of such motor-cars being controlled from a single point by means of a hand-operated master switch or controller.

In the accompanying drawings, Figure 1 is a diagram of a section of road provided with a block-signal and an electropneumatic controlling system for a single vehicle. Fig. 2 is a vertical sectional view of a manually-operated controlling-switch. Fig. 3 is a diagram of a portion of a modified safety apparatus. Fig. 4 is a sectional view of a cock illustrated in Fig. 3, but showing it in a different position. Figs. 5 and 6 are diagrammatic views showing parts of a controlling system and modifications of means for automatically breaking the control-circuit.

Referring particularly to Fig. 1 of the drawings, the controlling system shown is in all essential particulars like that set forth in Patent No. 684,609, granted October 15, 1901, to George Westinghouse as assignee of Ernest R. Hill, and reference to this patent may therefore be had for such description of details as may not be specifically set forth herein.

The main controller 1, here shown only in outline, is operated through a suitable set



of pipes, cylinders, and pistons by air-pressure from a supplemental reservoir 2, the main reservoir 3 of the system being supplied by a pump 4. An auxiliary reservoir 5 is provided for each brake-cylinder 6 and is connected with the supplemental reservoir 2 and with the train-pipe 7 in the usual manner. The admission of air-pressure to or the withdrawal of the same from the controller operating and release cylinders 8 and 9, the reversing-switch-operating cylinders 10 and 11, and the closing-cylinder 12 of the circuit-breaker 12<sup>a</sup> and the circuit-breaker-opening cylinder 13<sup>a</sup>, as the case may be, is controlled by the several magnets 13, 14, 15, 16, and 17 through the action of a manually-operated switch or master-controller 18 or automatically by reason of some accidental circuit interruption, as is fully set forth in the patent above referred to.

The various circuits in the controlling system, the overload and underload safety devices, and the structural details of the apparatus need not be specifically described, since they are fully set forth in the above-mentioned patent and do not constitute parts of my invention, except that they are parts of a fully-equipped and operative controlling system.

It will be seen that the brake-cylinder 6 is connected by means of a pipe 19 to the release-cylinder 9 of the controller, so that when the brakes are applied by the proper manipulation of any one of the engineer's valves 20 the main-controller drum will be returned to its off position, and thus open the power-circuit.

This system as thus far described is satisfactorily operative so far as the motorman's control of the starting, stopping, and regulation of the speed of the vehicle or train is concerned.

Additional safety devices which may operate independently of any action of the motorman are sometimes desired, however, and where single vehicles or trains, here represented by a truck 21, operate upon a road embodying a block-signal system I provide automatically-operating means for stopping such vehicles or trains, which will be now described. The road, here represented by track-rails 22, is equipped at intervals with signals 23, here shown as of a usual type, in which the signal-arms 24 are raised to horizontal position to indicate "danger" by gravity acting through a counterweight 25 and are depressed to inclined positions to indicate "safety"—i. e., freedom of the preceding block from obstruction—by means of an electropneumatic or other suitable system. The means for operating the signal-arms may be such as are known in the signaling art. I have shown a small lever 26, attached to the arm 24, the free end of the lever being connected by a link or rod 27 to one end of a two-armed pivoted lever 28, located near the track. The other end of the lever 28 is connected by a

slot-and-pin connection to a rod 29, the upper end of which is connected to a piston of the electropneumatic operating apparatus 30 and the lower end of which is connected to an arm 31, rigidly mounted upon a rod or shaft 32, which shaft also carries a tripping device 33. This combination of mechanism is such as to turn the tripping device 33 below the upper edges of the track-rails when the signal is in its safety position and to bring its free end above the rail, as indicated in the drawings, when the signal is in its danger position.

The truck 21 or some other portion of the vehicle as may be found convenient or desirable is provided with a branch pipe 34, leading to the train-pipe 7, and at the end of this branch pipe is a cock 35, having an arm 36, that projects into position to engage the tripping device 33 when the latter is elevated, as shown in the drawings, the operation being such that the movement of the arm 36 by engagement with the tripping device will relieve the air-pressure in the train-pipe and effect the setting of the brakes, and this operation in turn admits air from the brake-cylinder to the release-cylinder of the controller and effects the return of the controller to the off position, thus opening the power-circuit.

Instead of turning a cock in a branch from the train-pipe, as above specified, the tripping device 33 might engage and operate a switch-arm to directly or indirectly open the power-circuit and at the same time effect such movement of an electrically-controlled air-valve as would effect application of the brakes.

It is to be understood that the cock 35 and arm 36 may be located at the side or at the top of the vehicle and that the tripping device may be correspondingly located, so as to be engaged by the arm 36 when the signal is set at "danger," the structure and relative location of parts being merely indicative of any suitable operative means for effecting an approximately simultaneous setting of the brakes and breaking of the power-circuit.

In Fig. 2 I have shown a controller 37, the drum-shaft 38 of which is provided with a gear-wheel 39 and has attached to it one end of a coil-spring 40, the other end of the spring being attached to the cap 41 of the controller-casing, this spring being placed under tension or compression as the controller is moved toward or to the full "on" position, and therefore serving by the power thus stored up in it to return the drum to the "off" position when the latter is released.

The means for coöperating with the gear-wheel 39 comprises a pinion 42, mounted to move longitudinally upon a shaft 43, but being held against circumferential movement on the shaft by a feather 44. The pinion 42 is also connected to a piston 45, which is located in a cylinder 46 and is normally forced downward by a spring 47, so as to bring it into mesh with the gear-wheel 39. The shaft 43 is operated by means of a handle 48. The



lower end of the cylinder 46 is connected by means of a pipe 19<sup>a</sup> to the brake-cylinder of the vehicle on which it is located, so that when the brakes are set either by the action of the engineer's valve or automatically, as above set forth, the pressure of the air upward upon the piston 45 will move the pinion 42 out of mesh with the gear-wheel 39, as indicated in the drawings, and the spring 40 will return the drum to the off position.

It will of course be understood that air-pressure might be utilized for returning the shaft 38 and its drum to off position as well as for throwing the gearing out of mesh and in general that the specific mechanism shown is merely illustrative of any suitable operative means for effecting the desired result.

The controllers shown in Fig. 2 may be either a main controller manually operated, as indicated, or it may be a master-controller provided it is employed in a system where the return of the master-controller to the off position serves to effect the interruption of the main power-circuit.

As already indicated, the connections may be made such that the tripping device, which is set by the signal, may operate the cock 35 to set the brakes and at the same time to open the main circuit-breaker of the system or a special circuit-breaker instead of acting upon either the main or the master controller.

In case the coöperation of the signal system with the train system is such as to effect the opening of a circuit-breaker such provision may be made as will prevent the breaker from opening every time the brakes are set by the normal action of the motorman's handle. I have shown such a system in Figs. 3 and 4, in which the arm 36, which is tripped by the tripping device 33, operates a four-way cock 35<sup>a</sup>. This cock is connected to the train-pipe 7 by a branch pipe 34<sup>a</sup>, to the opening-cylinder 13<sup>a</sup> of the circuit-breaker 12<sup>a</sup> by a pipe 49, to the auxiliary brake-reservoir 6 by a pipe 50, and to the atmosphere by a port 51. It will be seen that when the arm 36 is in the position shown in Fig. 4 the auxiliary reservoir and the circuit-breaker cylinder 13<sup>a</sup> are in communication with each other and that the ports are closed. It follows, therefore, that the circuit-breaker will not be opened when the motorman sets the brakes by proper manipulation of the engineer's valve.

When the arm 36 is moved by the tripping device to the position shown in Fig. 3, the port opening into pipe 50 is closed and pipes 49 and 34<sup>a</sup> are opened to the atmosphere. It follows, therefore, that the air-pressure is so reduced in the train-pipe and in the circuit-breaker cylinder 13<sup>a</sup> that the brakes will be set and the circuit-breaker opened simultaneously, or substantially so. If this safety means is employed without changing the other parts of the general system shown in Fig. 1, the tripping device may be utilized to break the battery-circuit or some other provision made for cutting off connection between the

supplemental reservoir and the pipe 49 when the port 51 is open. I have illustrated such a means in Fig. 5, where the construction and arrangement of apparatus, so far as shown, are the same as in Figs. 1, 3, and 4, except that I have added a switch 52 for the battery-circuit, the arm 53 of which is connected to the arm 36 of the valve 35 by a rod or link 54. It will be readily understood that movement of the arm 36 by engagement with the tripping device 33 will actuate the switch-arm, and thus open the battery-circuit at the same time that the brakes are set and the power-circuit is broken. It will be also understood without further illustration that a switch of suitable structure and proportions may be utilized in substantially the manner here indicated to open the power-circuit directly.

Another means for breaking the power-circuit which it would be feasible to employ is a switch in the control-circuit, which would be opened directly by means of the brake-piston in the brake-cylinder. This means I have illustrated in Fig. 6, where the battery or control circuit is provided with a switch 55, the movable member 56 of which is mounted upon the piston-rod 57 of the brake-cylinder 6.

It will be further understood that the controlling system for the motors may be any one of the purely-electrical systems known in the art, if properly combined with the air-brake system, as hereinbefore indicated, or it may be purely a pneumatic system, provided such a system is found to be satisfactorily operative. In short, the present invention is intended to be utilized with any known controlling apparatus and system known in the art and operatively useful, provided the essential elements of setting the brakes and opening the power-circuit are effected at approximately the same time, either by the voluntary action of the motorman or automatically by the action of the signaling system.

I claim as my invention—

1. In an operating and controlling system for electrically-propelled railway-vehicles, the combination with an air-brake system and a manually-operated electric controller, of means depending upon the application of the brakes for moving the controller to the "off" position.

2. In an operating and controlling system for electrically-propelled railway-vehicles, the combination with an air-brake system and an electric controller, of a signal system and means actuated by the signals to effect both application of the brakes and interruption of the power-circuit in case a signal is disregarded.

3. In an operating and controlling system for electrically-propelled railway-vehicles, the combination with an air-brake system, an electric-power circuit and a controller, of a signal system, an interference device movable into operation by the movement of a signal to danger position and means engaged by said



interference device to effect setting of the brakes and opening of the electric-power circuit.

4. In an operating and controlling system  
5 for electrically-propelled railway-vehicles, the  
combination with an air-brake system, an  
electric operating system and a controller  
therefor, of signaling apparatus, a tripping  
10 device movable into operating position by the  
movement of a signal device to danger po-  
sition, an air-releasing cock connected to the  
brake system and having an arm projecting  
into position to be engaged by the tripping  
15 device and means also operated directly or  
indirectly by the tripping device to open the  
electric-power circuit.

5. In an operating and controlling system  
for railway vehicles and trains, the combina-  
20 tion with an electric-power circuit and a con-  
troller therefor, of a signal, a roadway inter-  
ference device operated thereby, an air-brake  
system, means connected therewith for effect-  
ing application of the brakes by engagement  
with the roadway interference device and  
25 means for effecting return of the controller to  
"off" position when the brakes are applied.

6. In an operating and controlling system  
for railway vehicles and trains, the combina-  
30 tion with an electric-power system embody-  
ing a controller, and an air-brake system, of

a track-signal, a tripping device operated  
thereby, a brake-setting cock having an arm  
adapted to engage said tripping device and  
means controlled from the brake system to  
effect return of the controller to "off" po- 35  
sition when the brakes are set.

7. In an operating and controlling system  
for railway vehicles and trains, the combina-  
tion with an electric-power system and an air-  
brake system, of a track-signal system and 40  
means automatically operated by the signals  
to simultaneously set the brakes and interrupt  
the power-circuit.

8. In an operating and controlling system  
for railway vehicles and trains, an electric- 45  
power circuit embodying a controller and a  
controlling-circuit embodying a governing-  
switch, of an air-brake system, a signal sys-  
tem having a tripping device and means en-  
gaged by the tripping device when the signal 50  
is in danger-indicating position to simultane-  
ously set the brakes and interrupt the power-  
circuit.

In testimony whereof I have hereunto sub-  
scribed my name this 9th day of April, 1902. 55

GEORGE GIBBS.

Witnesses:

CHARLES A. TERRY,  
WM. H. CAPEL.