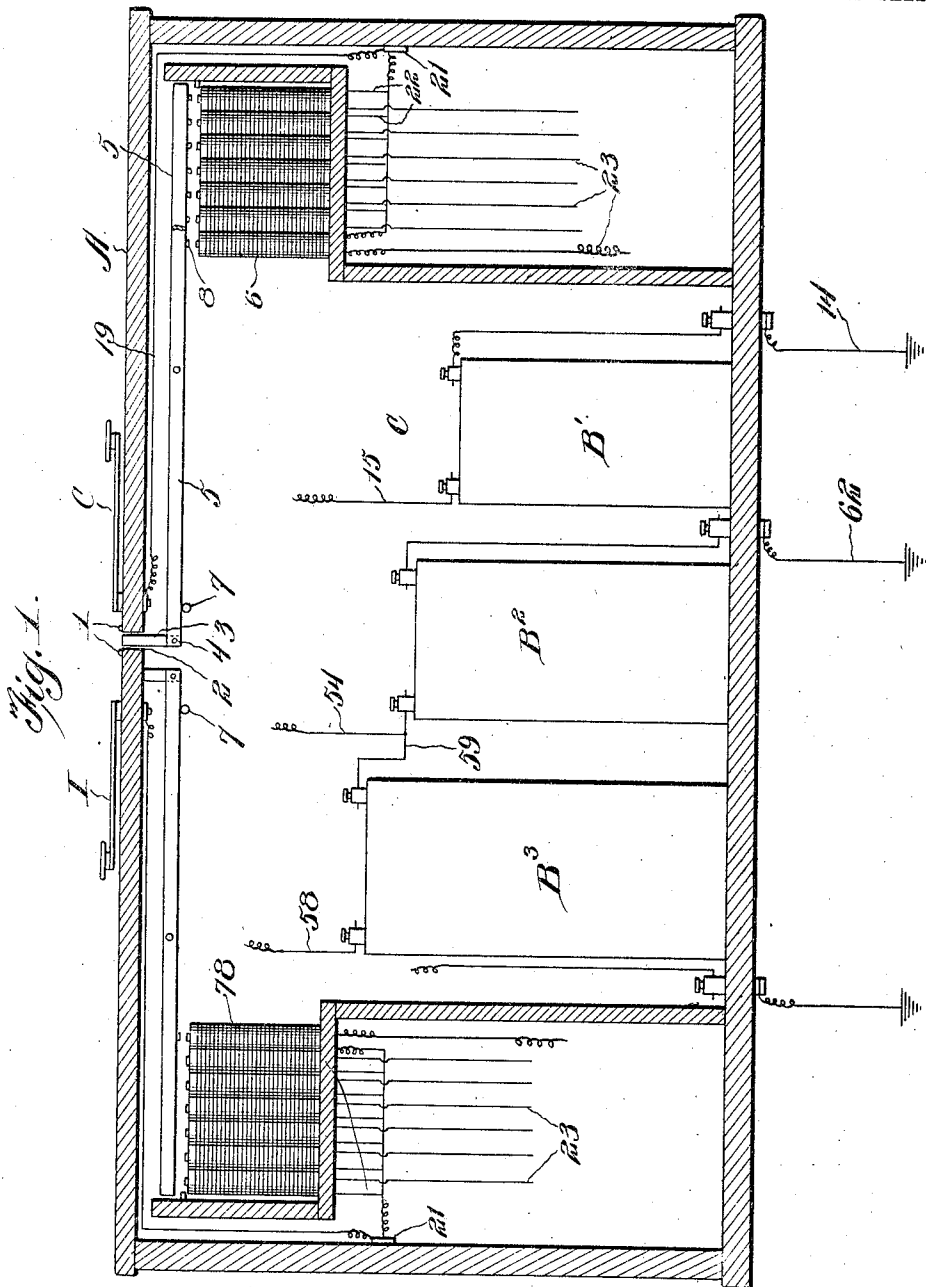


933,662.

4 SHEETS--SHEET 1.



Louis R. Heinrichs
C. Bradway.

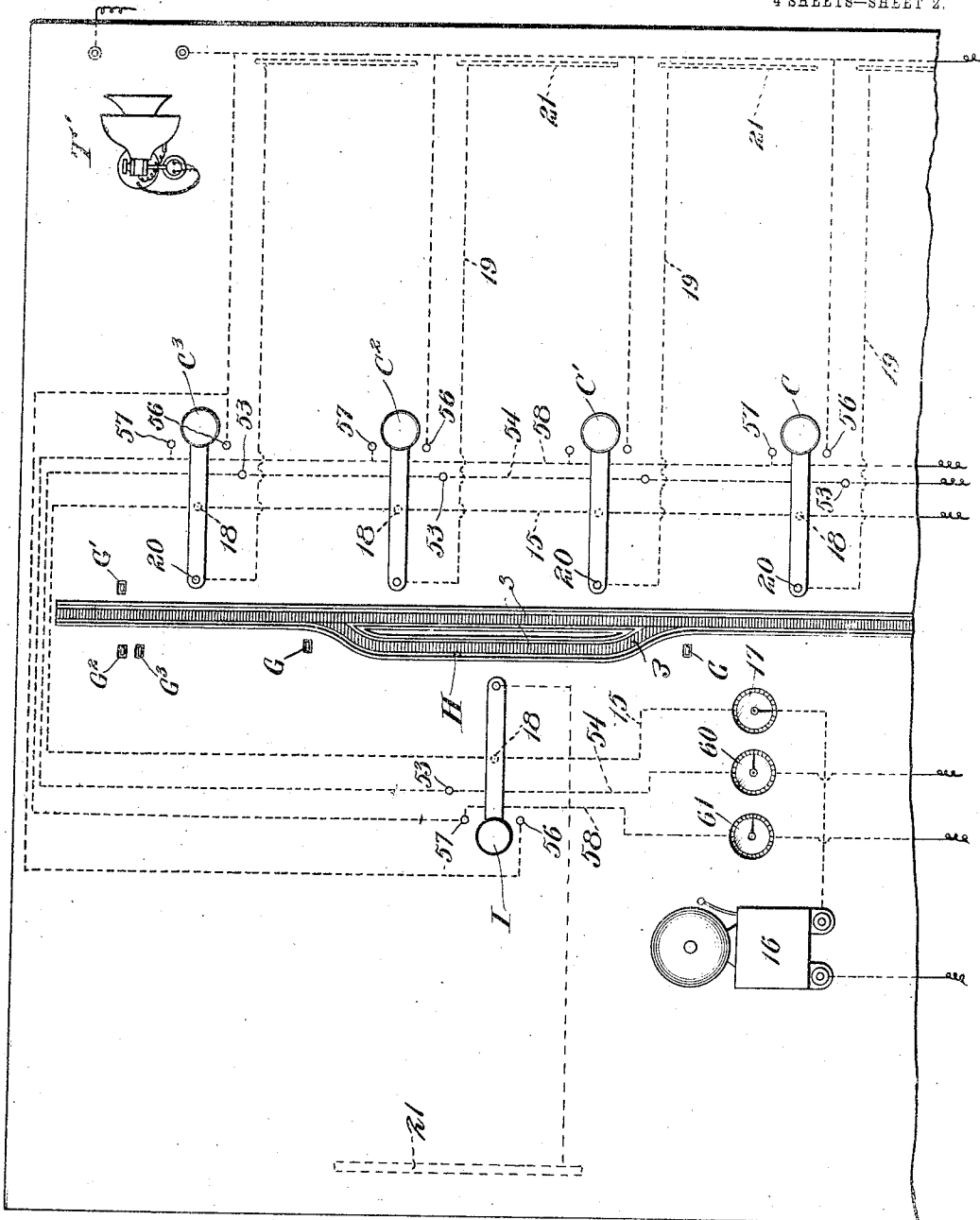
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Attorney

G. E. PATRICK.
 TRAIN DESPATCHER'S SIGNALING AND CONTROLLING SYSTEM.
 APPLICATION FILED MAY 22, 1908.

933,662.

Patented Sept. 7, 1909.

4 SHEETS—SHEET 2.



Witnesses

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Fig. 2.

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4 SHEETS—SHEET 3.

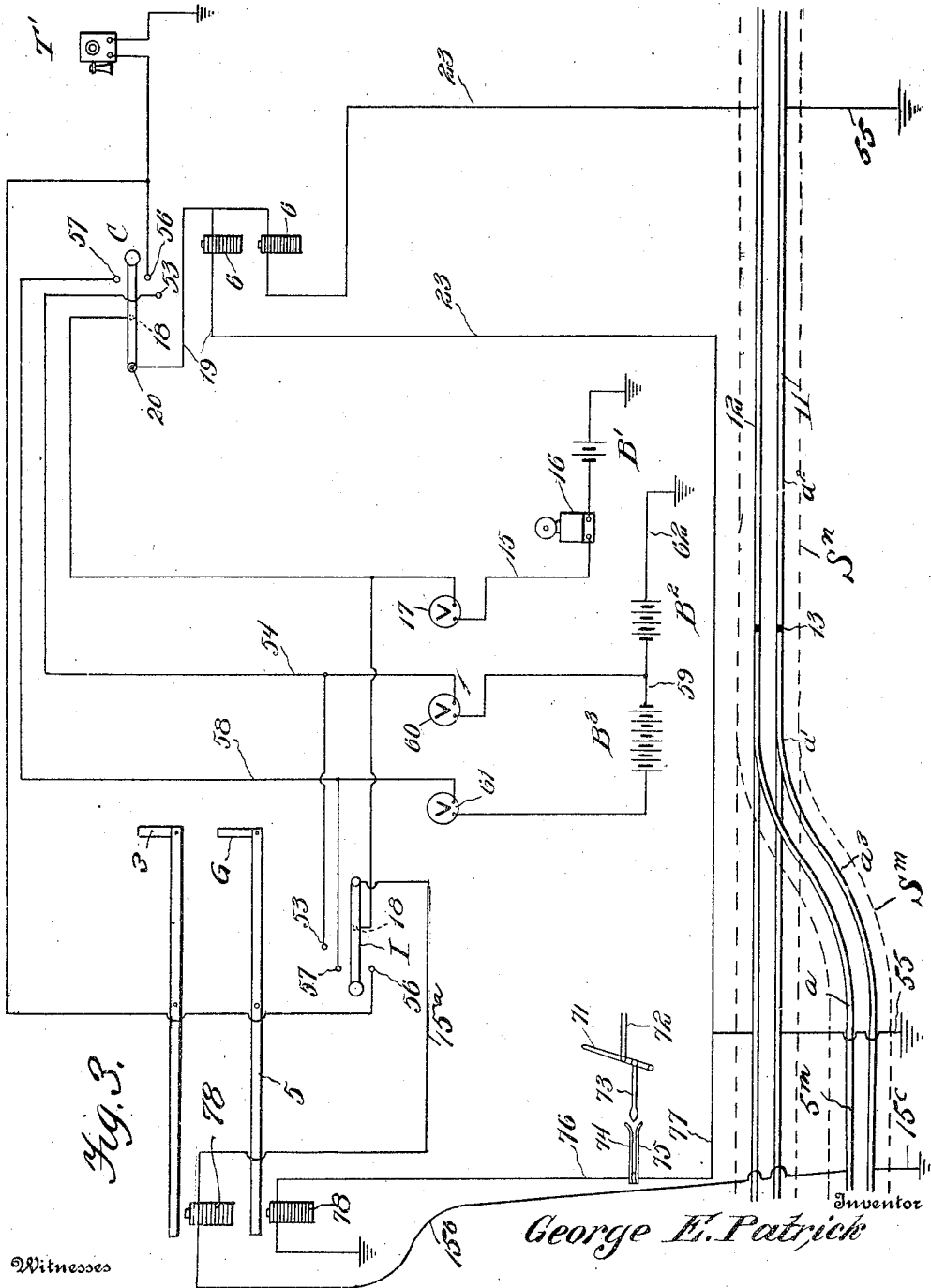


Fig. 3.

Witnesses

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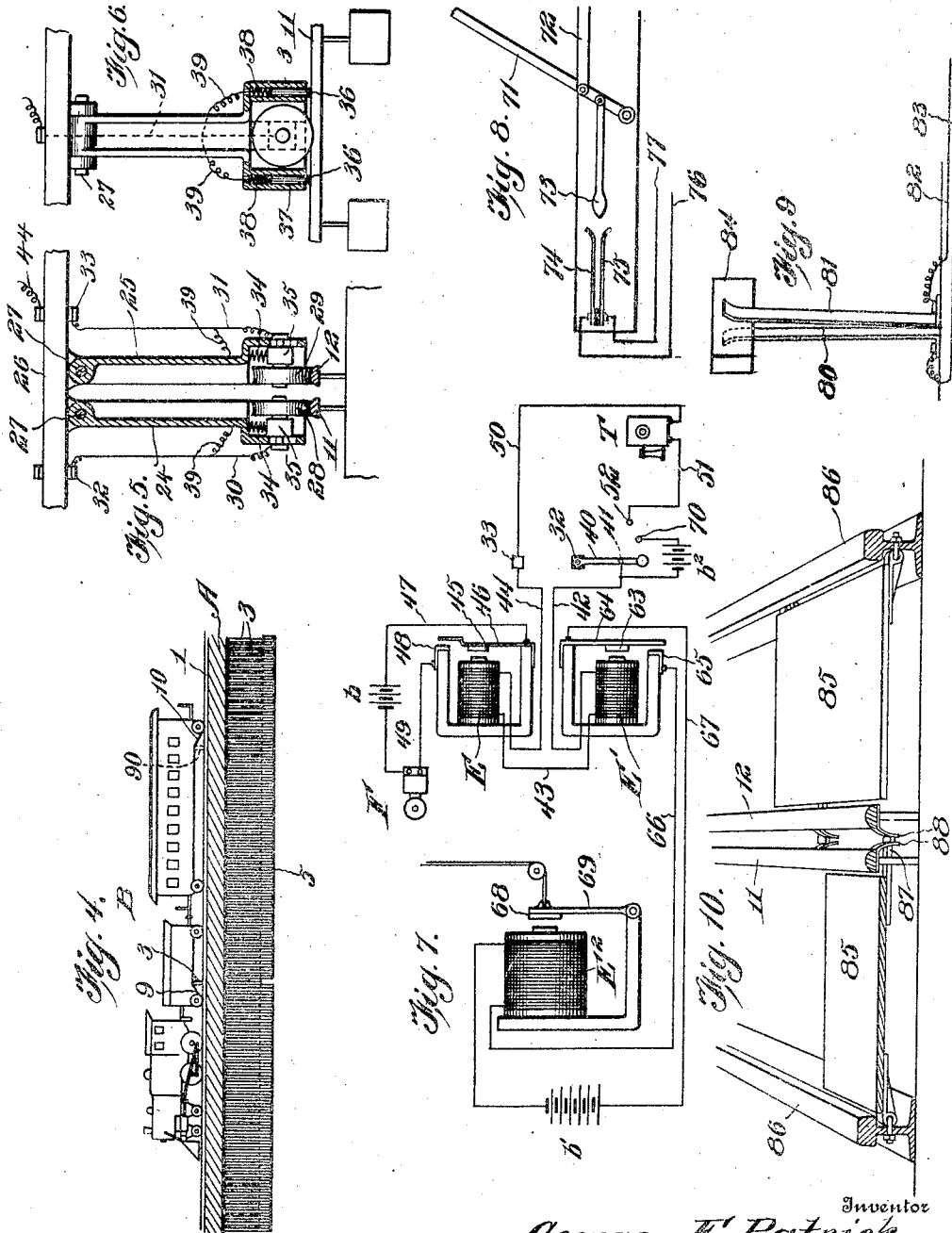
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4 SHEETS—SHEET 4.



Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE E. PATRICK, OF SALEM, VIRGINIA, ASSIGNOR TO PATRICK TRAIN CONTROLLING CORPORATION, OF SALEM, VIRGINIA, A CORPORATION OF VIRGINIA.

TRAIN-DESPATCHER'S SIGNALING AND CONTROLLING SYSTEM.

933,662.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed May 22, 1908. Serial No. 434,399.

To all whom it may concern:

Be it known that I, GEORGE E. PATRICK, a citizen of the United States, residing at Salem, in the county of Roanoke and State of Virginia, have invented new and useful Improvements in Train-Despatchers' Signaling and Controlling Systems, of which the following is a specification.

This invention relates to train despatcher's signaling and controlling system adapted for steam or electric railways, whereby the despatcher has entire control of his division of the road, so that the necessity of telegraph and block offices with their operators and signalmen can be dispensed with; and the invention relates more particularly to a system including a miniature railroad in the despatcher's office which is the exact representation of the actual railroad controlled by the despatcher and which has tell-tale miniature trains whereby the position of trains on the division is accurately indicated at all times, and whereby the operating condition of the road is clearly represented, so that accidents resulting from collisions, open switches, destruction of bridges by fire or floods or obstructions such as slides, are positively prevented; and further whereby any one or more trains can be stopped at any place by the train despatcher, and whereby telephonic communication can be had between a train out on the road and the train despatcher, or between such train and local stations along the road.

The invention has for one of its objects to provide a signaling and train-controlling system of this character which is of comparatively simple and inexpensive construction, capable of being installed at a relatively low cost, and which is reliable and efficient in service.

Another object of the invention is the provision of a train despatcher's operating board or table that includes a miniature railroad and tell-tale trains thereon and equipped with propelling devices automatically actuated by the train or trains on the main road so as to propel the tell-tale trains for the purpose of indicating at all times the relative positions of the trains traveling on the division controlled by the despatcher.

A further object of the invention is the equipment of a track with live rails or conductors each composed of sections insulated from one another and each section being

connected in circuit with an electro-magnet in a despatcher's office for operating one of the tell-tale train propelling devices, the circuit being completed by suitable means on the train traveling on the main road.

A further object is the employment of apparatus on the train which can be connected in circuit by a switch at the train despatcher's office for the purpose of signaling to the conductor, engineer or other member of the train crew to impart any necessary information, and whereby the train can be automatically stopped by the train despatcher under emergency conditions, as by opening the train pipe of the air brake system, the said electrical devices on the train being such that the train despatcher can be signaled when it is desired to obtain information from him.

The invention has as a further object the provision of a circuit connection and suitable devices for the purpose of indicating whether a track switch is open or closed, or whether the road is impassable by reason of a landslide, burning of a bridge or other dangerous condition, these conditions being indicated by the operation of appropriate indicating devices at the despatcher's office.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the appended claims.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a transverse section of the train despatcher's operating table or board. Fig. 2 is a fragmentary plan view thereof. Fig. 3 is a diagrammatic view of the circuit connections. Fig. 4 is a sectional view of a portion of the miniature track of the despatcher's board showing a tell-tale train thereon. Fig. 5 is a sectional view of one of the shoe devices or current-collecting means with which the passenger coaches, locomotives, cabooses, and other cars are equipped. Fig. 6 is a side view thereof with portions in section. Fig. 7 is a diagrammatic view of the circuit connections and electrical devices of a train for signaling to the train crew or stopping the train under emergency conditions. Fig. 8 is a detail view of a switch-operating lever and the circuit-controlling switch associated

therewith, whereby the circuit will be completed when the switch is opened to thereby operate an indicating device at the despatcher's office. Fig. 9 is a perspective view of an automatic switch which is adapted to close the signal circuit in case a bridge is destroyed by fire or flood. Fig. 10 is a perspective view of a portion of a track equipped with means whereby the signal circuit will be closed in case obstructions fall upon the track, and located at places where land slides or the like are likely to occur.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawings, A designates an operating table or board which is intended to be located in the train despatcher's office and on this board is an exact representation, in miniature form, of the railroad over which the despatcher has control. In the present instance, only a single track road is illustrated, but it is to be understood that it can be designed for a two or more track road. On the table A are rails 1 on which one or more tell-tale trains, such as B, Fig. 4, are adapted to run. Between the rails 1, the table has a slot 2 through which are adapted to be vertically projected propelling devices 3 whereby the tell-tale train can be moved step by step as an actual train is traveling successively over the sections of the main road. The propelling elements 3 are thin bars disposed side by side and are each hingedly connected at 4 with an operating lever 5 controlled by an individual electro-magnet 6. There are as many electro-magnets as there are levers 5 and each is contained in a separate circuit. Under the table A are rods 7 on which the inner ends of the levers normally rest, and each lever has an armature 8 disposed over its respective electro-magnet so as to attract the outer end of the lever and thus throw the inner end upwardly to raise the projecting element 3 thereof above the table. The miniature train B has an inclined abutment 9 on one car with which the propelling elements 3 are adapted to successively engage to move the car forward, and another car has a reversely-inclined abutment 10 with which the propelling elements are adapted to engage when moving the tell-tale train backwardly.

The railroad track is equipped with two spaced conductors 11, 12 passing centrally along the track, Fig. 3, that are composed of sections a^1 , a^2 , &c., that have their meeting ends spaced apart and insulated from each other as indicated at 13, each section being of any appropriate length and being electrically connected with an electromagnet at the despatcher's office for the purpose of operating one of the propelling elements when a train is passing over such section, there being as many propelling elements as there are

conductor sections in the entire length of the track of the division over which the despatcher has control. The current for the circuits in which the electro-magnets are included is derived from a battery B^1 which supplies a current of about five volts, one side of the battery being grounded by a wire 14, Figs. 1 and 3, while the other side of the battery connects with the wire 15 that leads to the various controlling switches C, C^1 , C^2 , C^3 , &c., at the despatcher's board.

In the wire 15 is located a bell 16 which is so wound as to be unaffected by the current from the battery B^1 but which can be sounded by connecting in a battery on any train in the division for the purpose of calling the despatcher when necessary, and also in the wire 15 is a volt meter 17 to indicate that current of proper voltage is passing through the circuit. On the top of the switch-board A are contact points 18 located under each switch lever for the purpose of connecting the electro-magnets with the battery B^1 . Each switch is connected by a wire 19 at the point 20 with a bus bar 21 under the table that is connected as shown in Fig. 1 with a group of electro-magnets. Leading from the bus bar 21 are wires 22 connected to the individual magnets and from the magnets are wires 23 which are grouped together into a cable that runs along the railroad either on poles or in underground conduits and connected to the successive sections of the conductors 11 and 12 on the railroad track. All the despatcher's switches are normally connected with the electro-magnets, as shown in Fig. 2, so that as the train on the main line passes over the division, the tell-tale train propelling devices will be successively operated and move the tell-tale train correspondingly with the movement of the main train.

On at least one of the cars of a train is a current-collecting device or shoe such as shown in Figs. 5 and 6, the same consisting of a pair of members 24, 25, depending from the floor 26 or other suitable part of the car and mounted to swing on pintles 27 so that as the car vibrates from one side to the other, the shoes will be maintained on the conductors 11, 12, of the track. Supported on the members 24, 25, are wheels 28, 29, bearing respectively on the conductors or current-carrying rails 11, 12, and these wheels are connected by wires 30, 31, with binding posts 32, 33, respectively which are connected with electrical apparatus within the car. The wheels 28, 29, are urged into connected with electrical apparatus within by springs 34 pressing on the bearing boxes 35, and to further insure good electrical contact between the current-carrying rails and shoes, the members 24, 25, are provided with brushes 36 of any suitable character that are

mounted in sockets 37, Fig. 6, and pressed downwardly by springs 38 into contact with the current-carrying rails, the brushes being connected by branch wires 39 with the wires leading to the binding posts 32, 33. By this means, the various circuits are completed as the train passes over the track and the current passes from rail 12 through the wheel 29 and brushes of the member 25, wire 31, binding post 33, electrical connections within the car, binding post 32, wire 30, wheel 28 and brushes associated therewith, and conductor 11, thus completing the circuits that lead to the despatcher's office so as to operate the tell-tale train propelling devices one after the other as the main train passes over the successive sections of the conductors 11, 12.

The electrical apparatus within the locomotive, passenger coach, caboose, or other car, for the purpose of enabling the despatcher to signal to one of the train crew, or the latter to signal to the despatcher, or for the despatcher to stop the train under emergency conditions, is shown in Fig. 7. This apparatus comprises electro-magnets E, E¹, E², which are wound to respond to currents of different values. The wires 30 and 31 of the current collecting device shown in Fig. 5 are connected with the binding posts 32, 33, respectively, and the binding post 32 is connected with a switch lever 40, Fig. 7, which has a contact point 41 connected with the wire 42 that leads to the electro-magnet E¹, and this electro-magnet is connected with the electro-magnet E by a wire 43, and the electro-magnet E is also connected with the binding post 33 by a wire 44, thus including the windings of the electro-magnets E, E¹, in the circuit through which the current passes that is supplied by the five-volt battery B¹ at the despatcher's office when the apparatus is in normal operating condition. This current is not of sufficient strength to operate either armature of the electro-magnets, but in case it is desired to signal to the train crew, the voltage is raised to ten volts by connecting the battery B², Figs. 1 and 3, of the despatcher's office, so that a current of higher voltage will flow through the circuit and energize the electro-magnet E, thereby drawing its armature toward the electro-magnet, whereupon a local circuit is closed that includes the signal bell F. The armature 45 is mounted on a spring 46 which is connected by a wire 47 with the battery b of the local circuit in which the bell F is included, and this spring is adapted to engage with the contact 48 that is connected with the bell and battery by a wire 49. When the train crew is thus signaled, a telephone set can be connected in circuit so as to receive instructions from the despatcher; this telephone circuit consisting of a telephone set T, Fig. 7, that is connected

by a wire 50 with the binding post 33 and by a wire 51 with the contact point 52 with which the circuit-controlling lever 40 is adapted to contact.

When the despatcher desires to signal to the train crew, he selects the appropriate switch C, C¹, &c., and moves the same until it engages the contact point 53 of the switch-board A, thereby connecting the wire 54 that includes the battery B² in circuit, so that current will pass from the battery through the wire 54, switch C, wire 19, one of the electro-magnets of the group or bank controlled by such switch C, wire 23, the section of the current-carrying conductor 12 with which the current-collecting shoe is in contact, thence to the wire 31 of such shoe to the binding post 33, through the electro-magnets E, E¹, by wires 44, 43, 42, switch 40, binding post 32, wire 30, and section of another current conductor 11, and then to ground by the wire 55 connected with such conductor, as shown in Fig. 3. This current will be of sufficient strength to operate the electro-magnet E so that the local circuit including the bell F will be closed. As soon as this is done the train despatcher throws the switch lever C into engagement with the contact point 56 so as to connect the telephone set T¹, Figs. 2 and 3, into circuit so that he can give telephonic orders to the conductor or other member of the train crew out on the road.

If, under emergency conditions, the conductor or engineer of the train does not obey orders given by the train despatcher, or for any other reason it becomes necessary to immediately stop the train out on the road, the train despatcher throws the appropriate switch C, C¹, &c., into engagement with the contact point 57 that connects by a wire 58 with the fifteen volt battery B³ that is, in turn, connected in series by a wire 59 with the battery B², so that a current of twenty-five volts will flow through the circuit. At the despatcher's table are volt meters 60, 61, for reading the voltage of the currents flowing when the batteries B², B³, are connected in circuit. This twenty-five-volt current is sufficient to energize the electro-magnet E¹, and it flows through a path consisting of the batteries B², B³, wire 58, contact point 57, the appropriate switch C, C¹, &c., wire 19, one of the electro magnets 6, wire 23, current conductor 12, one of the current-collecting shoes of the train, binding post 33, both electro-magnets E, E¹, wires 44, 43, 42, switch 40, binding post 32, the other shoe of the current-collecting device of the train, current-carrying conductor 11, wire 55 to ground, thence back to the despatcher's office to the negative side of the batteries by the wire 62. The electromagnet E¹ is thus brought into service and attracts the armature 63 that is mounted on a spring 64 of

greater strength than the spring 46 of the magnet E. The spring 64 is adapted to engage a contact 65 that is connected with the electro-magnet E' by the wire 66, and the spring 64 is connected by wire 67 with a twenty-five-volt battery b' that also connects with the electro-magnet. The electro-magnet E' thus controls a local circuit in which the more powerful electro-magnet E' is included. The latter electro-magnet has its armature 68 connected with a lever 69 that controls any suitable mechanism for opening the train pipe of the air brake system or other suitable apparatus for stopping the train under emergency conditions. By thus equipping the train with electrical devices of the class set forth, the despatcher can telephone to the conductor of a train out on the road, or the latter can call up the despatcher or any station along the road equipped with telephones, and furthermore, the despatcher can stop the train whenever necessary. The same wires through which the five-volt current passes for energizing the various electro-magnets at the despatcher's office for operating the tell-tale train devices also serve for transmitting the ten and twenty-five-volt currents and for telephonic and signaling connections between the moving train and despatcher or station operators along the road. In case it is desired to call up the despatcher from the train, the switch 40 is connected with the contact point 70, Fig. 7, so as to thereby include in circuit a battery b' which generates a current of five volts which, in connection with the current supplied by the battery B' at the despatcher's office, will produce a current of sufficient voltage to operate the bell 16 at the despatcher's office, which bell being sounded informs the despatcher that telephonic connections are desired with him. He immediately connects in the telephone T' by any appropriate switch C, C', C'', Figs. 2 and 3, depending upon the position of the train on the road so that he can communicate with the train, the conductor on the train having in the meantime connected his telephone set T in circuit by moving the switch 40 to the contact point 52.

Whenever there are side tracks in the main line, the track switches therefor are equipped with circuit-closing devices, such for instance, as shown in Fig. 8. The switch-operating lever 71 moves the switch point by the link 72, and attached to the lever is a metal piece 73 that is adapted to engage between spring contacts 74, 75, that are connected in circuit by wires 76, 77, as shown in Figs. 3 and 8. When the circuit is thus closed by operating the track switch-controlling lever 71, this fact will be shown at the despatcher's office by an indicating device G, Fig. 2.

The miniature track is formed with a

siding H and an indicating device G is arranged at each end thereof so as to show which switch of the siding is open. The devices G are similar to the tell-tale train-propelling means and are operated by electro-magnets energized by the closing of the circuit when the switches of the main line at the siding are opened. Also in the side track H of the despatcher's board are train-propelling means 3 actuated by the electro-magnets 78, Fig. 1, that are controlled by the despatcher's switch I that is located at the opposite side of the track from the switches C, C', &c. This switch I is adapted to be connected with any of the wires connected with the batteries B', B'', B''', and the telephone T' by engagement with the contact points 18, 53, 56, 57, so that communication between the despatcher and train while at the siding can be obtained. The siding in the main track is divided into insulated rail sections like the main track shown in Fig. 3, and the sections of one rail of the siding are grounded while the sections of the other rail are connected by wires with their respective electro-magnets 78, Fig. 1, so that as a train passes through the siding, the circuits will be successively closed for raising the propelling devices G of the siding H of the despatcher's office to propel the miniature train on such siding. By manipulating the switch I, the despatcher can communicate with the conductor of the train on the siding of the main track or stop the train under emergency conditions, just as he can with a train at a point in the main line by the switches C, C', C'', etc. When a train enters the siding at S^m of the main track Sⁿ, the circuit will be completed through the switch I of the despatcher's switchboard so that the first propelling device G will be raised. By reference to Fig. 3, it will be understood that the current flows through the circuit consisting of the battery B', wire 15, switch contact point 18, lever I, wire 15^a and electromagnet 78 connected therewith, wire 15^b, one of the conductors α^x for the siding S^m of the main track, through the current collecting device or shoe of the train passing through such siding, the other conductor α^z for the siding, to ground through the wire 15^c and thence to the grounded side of the battery B'. As the train proceeds along the main siding, the next electro-magnet will be energized when the adjacent section of the conductors of the siding are reached by the collecting device or shoe of the train so that the next propelling device G of the despatcher's switchboard will be raised to thereby move the miniature train to such switchboard along the siding H, in accordance with the movement of the actual train in the main siding S^m. In case the despatcher wishes to telephone to the train crew while the train is in the track 130

siding S^m , he throws the switch lever I to the contact point 53 so that current of ten volts will flow from the battery B^2 through the switch I , wire 15^a , one of the electro-magnets 78, wire 15^b , collector device or shoe of the train, and the electrical appliances on the train so that the bell F , Fig. 7, will be energized, the current proceeding through the wire 15^c and ground to the opposite side of the battery B^2 . After thus signaling the train crew, the despatcher connects in his telephone T by throwing the switch lever I , Fig. 3, to the proper point while the engineer or conductor of the train crew connects in his telephone T by manipulating the lever 40, Fig. 7, so that telephonic messages can be interchanged. That is to say the despatcher moves the switch lever I to the point 56 and the circuit will be completed through the wire 56^a , telephone set T' which includes a battery, (not shown), thence by way of the ground to the grounded wire 15^c conductor a^x , the shoe of the contact device on train contacts with the said conductor, lever 40 of Fig. 7, contact point 52, train telephone set T , wire 50, binding post 53, the other shoe of the contact device, conductor a^x of Fig. 3, wire 15^b , electromagnet 58, wire 15^a , and thence back to the switch lever I .

When the train on the main track siding is to be stopped under emergency conditions, the train despatcher will throw the switch lever I to the point 57 so as to connect both batteries B^2 and B^3 in circuit to thereby call into play the emergency devices of the train. It will thus be seen that the switch I is used only for controlling the circuits for signaling to a train on a siding in the main track, for stopping such train under emergency conditions and for enabling the train to operate the propelling devices G of the despatcher's switchboard. In other words, the switches C , C^1 , C^2 , etc., are used in connection with the main line of a railroad, while the switch I is used only in connection with sidings, switches or the like.

Where bridges occur in the main line that are likely to be destroyed by fire or flood, a switch-controlling device such as shown in Fig. 9 is employed which comprises a pair of spring metal members 80, 81, that are connected with wires 82, 83, that are included in circuit with an electro-magnet and a source of current at the despatcher's office so that when the circuit is closed by the members 80, 81, a signaling device such as G^1 similar to the signaling device G , Fig. 2, will be brought into notice. The contact members 80, 81 are held separated by a block 84 of wood or the like which can be consumed by fire or dislodged or washed away by flood, thus permitting the circuit to be closed for warning the despatcher that the bridge is in danger of destruction, so that he can stop any train of his division

before the bridge is reached. Where land slides are apt to occur, the track is provided with circuit-controlling devices such as shown in Fig. 10. Between the tracks are hinged plates 85 disposed between the track rails 86 and the current conductors 11 and 12. The plates have members 87 that engage between spring contacts 88 attached to the conductor rails 11, 12, and so disposed that when the main track is in operating condition, the circuit will be maintained open. In case of rocks, earth or other obstructions falling upon the plates 85, the members 87 will be disengaged from the springs 88 so as to permit them to come together and close the circuit from one conductor 11 to the conductor 12, thus actuating a signaling device such as G^2 at the despatcher's office for enabling the despatcher to warn a train approaching the obstruction in time to avoid a wreck. The current-carrying conductors 11, 12, will be maintained in operating condition by means of the track walker and the latter may be required by the rulers of the road to periodically call up the train despatcher to see if any orders are to be received. For this purpose, the track walker can be provided with a portable telephone set, and by connecting one side with one conductor 11 and connecting the other side of the telephone set to the conductor 12, he can operate a signaling device such as G^3 at the despatcher's office and inform the despatcher that telephonic communication is desired.

Freight trains will be usually equipped with current-collecting devices and shoes both at the locomotive and caboose, where also may be provided electrical device such as shown in Fig. 7, and the freight cars themselves may be equipped with current-collecting shoes or devices without the electrical apparatus for signaling or train-stopping purposes. In case a freight train should pull apart, this fact would be automatically revealed to the despatcher by causing the tell-tale train to also pull apart. For instance, if the train on the main road is disconnected, the part attached to the engine will, of course, continue to run, and the trailing portion of the train will sooner or later come to rest and while at rest, it will maintain a closed circuit that includes an electro-magnet controlling one of the tell-tale train-propelling devices and hold the latter in projected position as indicated at 90, Fig. 4. The movement of the portion of the freight train connected with the engine will cause the propelling devices at the despatcher's office to continue to move the tell-tale train along until the device at 90 engages the abutment 10, whereupon the rear car of the tell-tale train will be stopped with the result that the engine will be separated therefrom as the engine is forced forwardly

by those propelling devices that are successively connected in circuit by the movement of that portion of the freight train that is connected with the engine. When this event occurs, the despatcher can immediately notify the engineer or conductor of the freight train that the train has been separated and thus give the train crew an opportunity to go back and connect with the detached portion of the train before an accident occurs to a following train.

From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim is:—

1. In a train despatcher's controlling and signaling system, the combination of a despatcher's switch-board consisting of a miniature track, a train movable on the track and provided with an abutment, a main track, and electrically-operated devices on the switch-board actuated successively for engaging the abutment to move the train for indicating the operating condition of the main track.

2. In a train despatcher's controlling and signaling system, the combination of a despatcher's switch-board consisting of a miniature track having a longitudinal slot, a train movable over the miniature track and provided with an abutment, a main track, electrically-operated devices disposed in the slot of the switch-board and projectable upwardly from the slot for engaging the abutment to move the train for indicating the operating condition of the main track, and means at the switch-board for controlling the train or trains on the main track.

3. In a train despatcher's system, the combination of a despatcher's switch-board including a miniature track representing the main track over which the despatcher has control, means on the main track for successively closing separate circuits by the movement of a train, and devices at the switch-board actuated by the said circuits for indicating the operating condition of the road, said circuits being so arranged as to control the devices for indicating that a train has become separated into parts.

4. In a train despatcher's system, the combination of a despatcher's switch-board including a miniature track representing the

main track over which the despatcher has control, means on the main track for successively closing separate circuits by the movement of a train, devices at the switch-board actuated by the said circuits for indicating the operating condition of the road, and means for using any circuit for signaling between the despatcher's office and a train on the main track.

5. In a train despatcher's system, the combination of a despatcher's switch-board including a miniature track representing the main track over which the despatcher has control, means on the main track for successively closing separate circuits by the movement of a train, devices at the switch-board actuated by the said circuits for indicating the operating condition of the road, and means whereby the despatcher may stop any train in his division.

6. In a despatcher's signaling system, the combination of a switch-board representing in miniature the main track over which the despatcher has control, said board being divided into sections, a plurality of circuits between each section of the switch-board and main track and automatically closed by the passage of a train, means at the switch-board for showing the movement or position of the train or trains on the main track, and means for changing the current passing through the circuits for signaling between the train and despatcher and for stopping the train at any point in its travel.

7. In a despatcher's signaling system, the combination of a despatcher's switch-board including a track representing in miniature the main track or road over which the despatcher has control, a tell-tale train on the miniature track having spaced abutments, propelling means arranged to engage one or more of the abutments, electrical circuits for the said means extending along the main track and leading to the despatcher's switch-board, and separate electrically-operated devices at the switch-board actuated by the closing of different circuits for indicating the operative condition of the road.

8. In a system of the class described, the combination of a despatcher's switch-board, a main track, a plurality of independent circuits between the switch-board and track and successively closed by a train traveling over the latter, devices at the switch-board successively actuated by the closing of the circuits, means for varying the flow of current through the circuits, means responsive to a given current for signaling between the switch-board and train, and means responsive to another current for stopping the train.

9. In a system of the class described, the combination of a despatcher's switch-board, a main track, a plurality of independent circuits between the switch-board and track

and successively closed by a train traveling over the latter, devices at the switch-board successively actuated by the closing of the circuits, means for varying the flow of current through the circuits for signaling between the switch-board and train, and means for further varying the flow of current controlled at the said switchboard for stopping the train under emergency conditions.

10 10. In a system of the class described, the combination of a train despatcher's switch-board, a plurality of track circuits controlled by the movement of the train, successively operated devices at the switch-
15 board responsive to flow of current of certain value, means at the switch-board for further increasing the current flowing in any circuit closed by the train, and an emergency train stopping device responsive to a
20 maximum increase of current.

11. In a system of the class described, the combination with a train despatcher's switch-board, a main track, circuits extending along the track and controlled by the movement
25 of a train, a plurality of switches on the board, devices at the switch-board and connected with the various circuits for indicating the movement or position of trains on the track, signaling and train stopping
30 devices, connections whereby any switch on said board can connect the stopping and signaling devices in circuit, and separate sources of current adapted to be connected in
35 circuit for operating the indicating, signaling and stopping devices independently.

12. In a system of the class described, the combination of a despatcher's switch-board including a miniature track, a tell-tale train thereon, and a plurality of independently-
40 actuated propelling devices controlled by the movement of a train on the main line, said devices being arranged to indicate when a train on the main track has separated into
45 parts.

13. In a system of the class described, the combination of a despatcher's switch-board including a miniature track, a tell-tale train thereon, a plurality of independently electro-
50 magnetically actuated propelling devices projected upwardly from the miniature

track for moving the train, a main track, an electrical circuit controlling each device, and means for successively controlling the circuits by the movement of a train on the main track.

14. In a system of the class described, the combination of a despatcher's switch-board including a track and a siding, a main track and siding, automatically-actuated devices at the switch-board controlled by the move-
60 ment of a train or trains on the main track and siding for indicating the position of such train or trains, means for signaling between the switchboard and the train on the main track or siding, and means for stop-
65 ping a train on the main track or siding.

15. In a system of the class described, the combination of a switch-board including a miniature track and siding, a main track and siding, switches for connecting the main
70 track and the siding, means at the switch-board located adjacent the points of connection between the miniature track and siding for indicating the condition of the
75 switches, circuits extending between the main track and switchboard, additional circuits extending between the siding and switchboard, means for utilizing any of the
80 said circuits for telephonic connection between the despatcher and train on the main track or siding.

16. In a system of the class described, the combination of a despatcher's switch-board including a miniature track, a main track, electric circuits between the tracks and controlled by the movement of a train over the
85 main track, a tell-tale train on the miniature track and having abutments, electro-magnets successively cut into circuit, and devices controlled by the electro-magnets and
90 moved successively into engagement with either one of the abutments of the train for propelling the latter.

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

GEORGE E. PATRICK.

Witnesses:

W. J. PUCKETT,
R. W. KIME.