

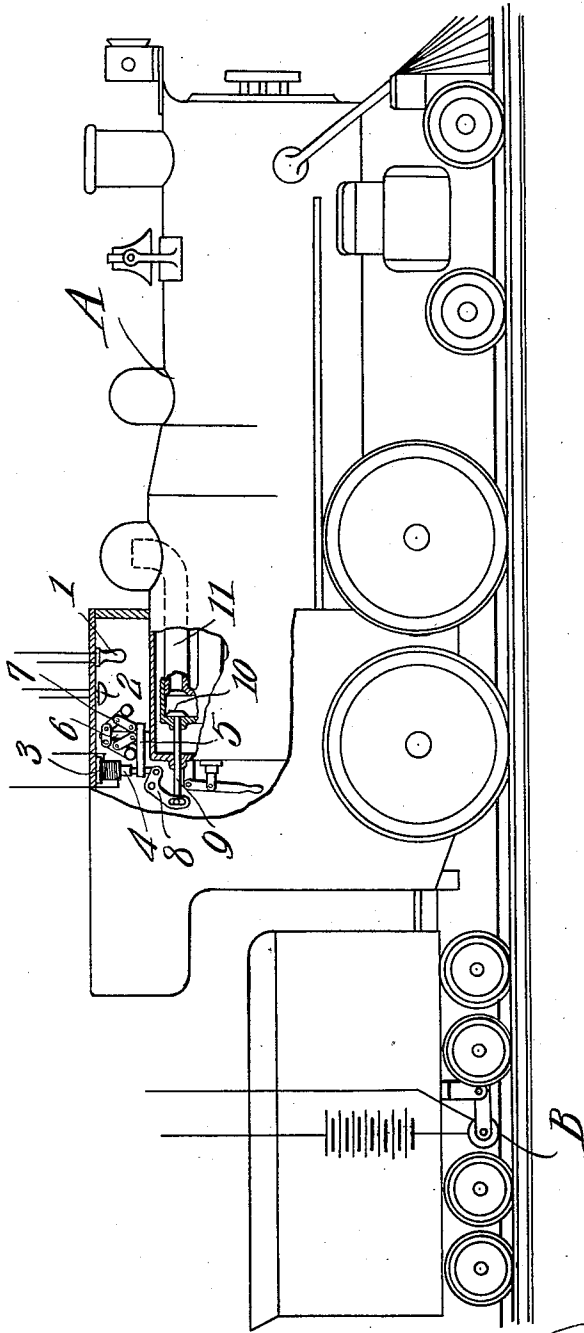
F. PORTO.  
AUTOMATIC SIGNAL DEVICE.  
APPLICATION FILED APR. 27, 1910.

1,007,387.

Patented Oct. 31, 1911.

4 SHEETS—SHEET 1.

*Fig. 1.*



Witnesses  
*Frank B. Woodard,*  
*E. Walton Brewington,*

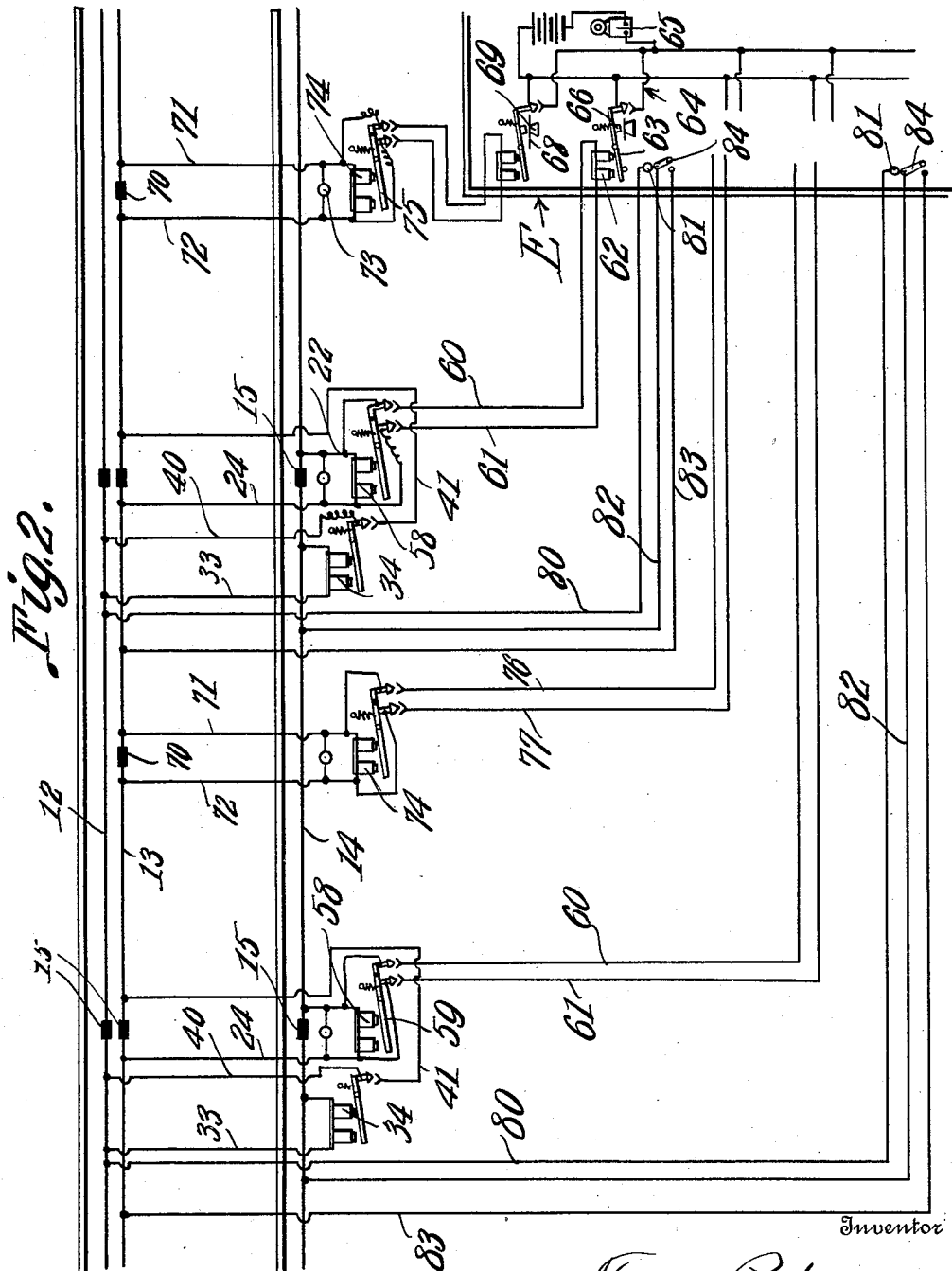
Inventor  
*Frank Porto,*  
By *Henry J. Brewington,*  
Attorney

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4 SHEETS—SHEET 2.



*Fig. 2.*

Witnesses  
 Frank B. Woodrow.  
 C. Walton Brewington.

Inventor  
 Frank Porto,  
 by Henry J. Brewington,  
 Attorney

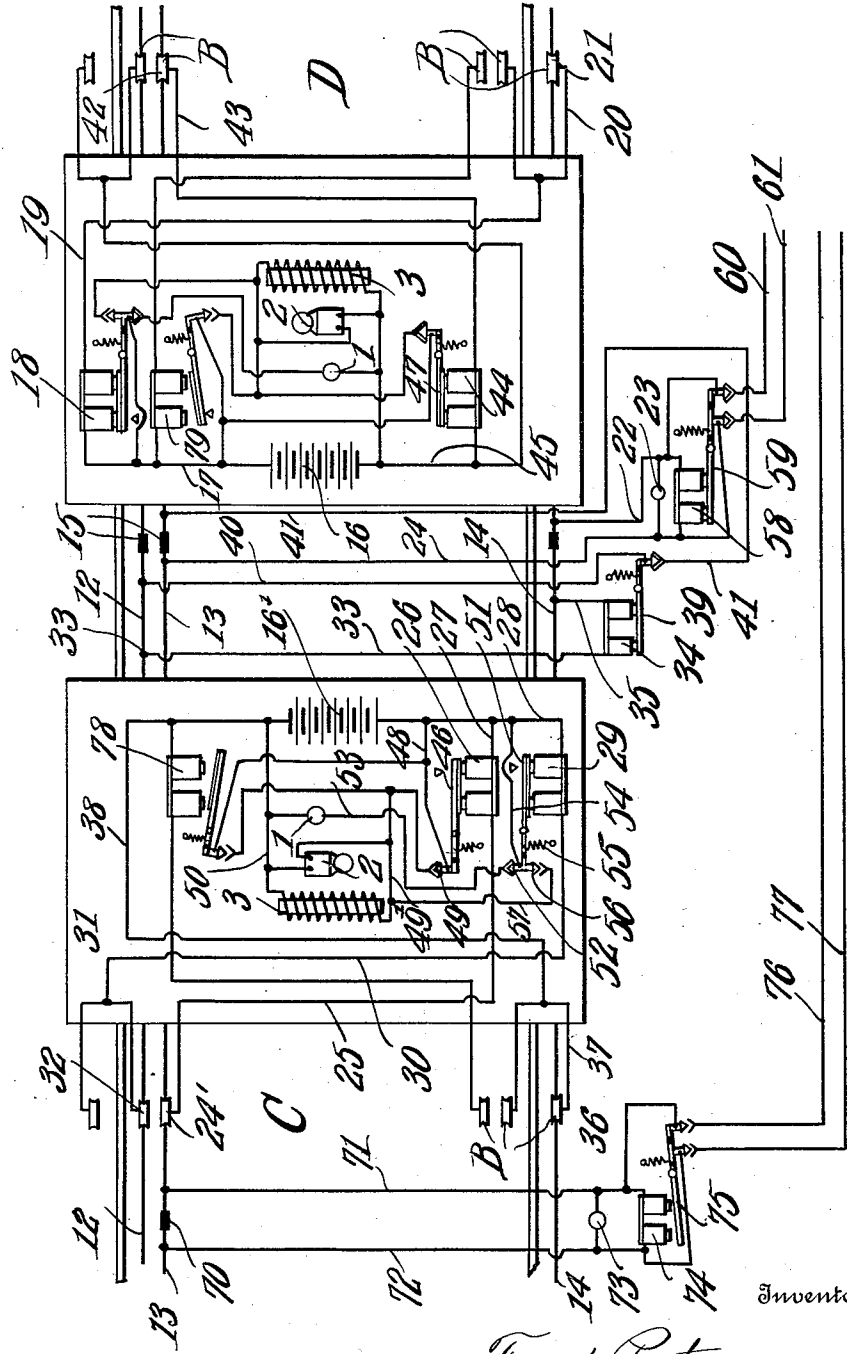
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4 SHEETS—SHEET 3.

*Fig. 3.*



Inventor

*Frank Porto,*

Witnesses  
*Frank B. Wooden.*  
*E. Walton Brewington.*

By *Henry J. Brewington,*  
 Attorney

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4 SHEETS—SHEET 4.

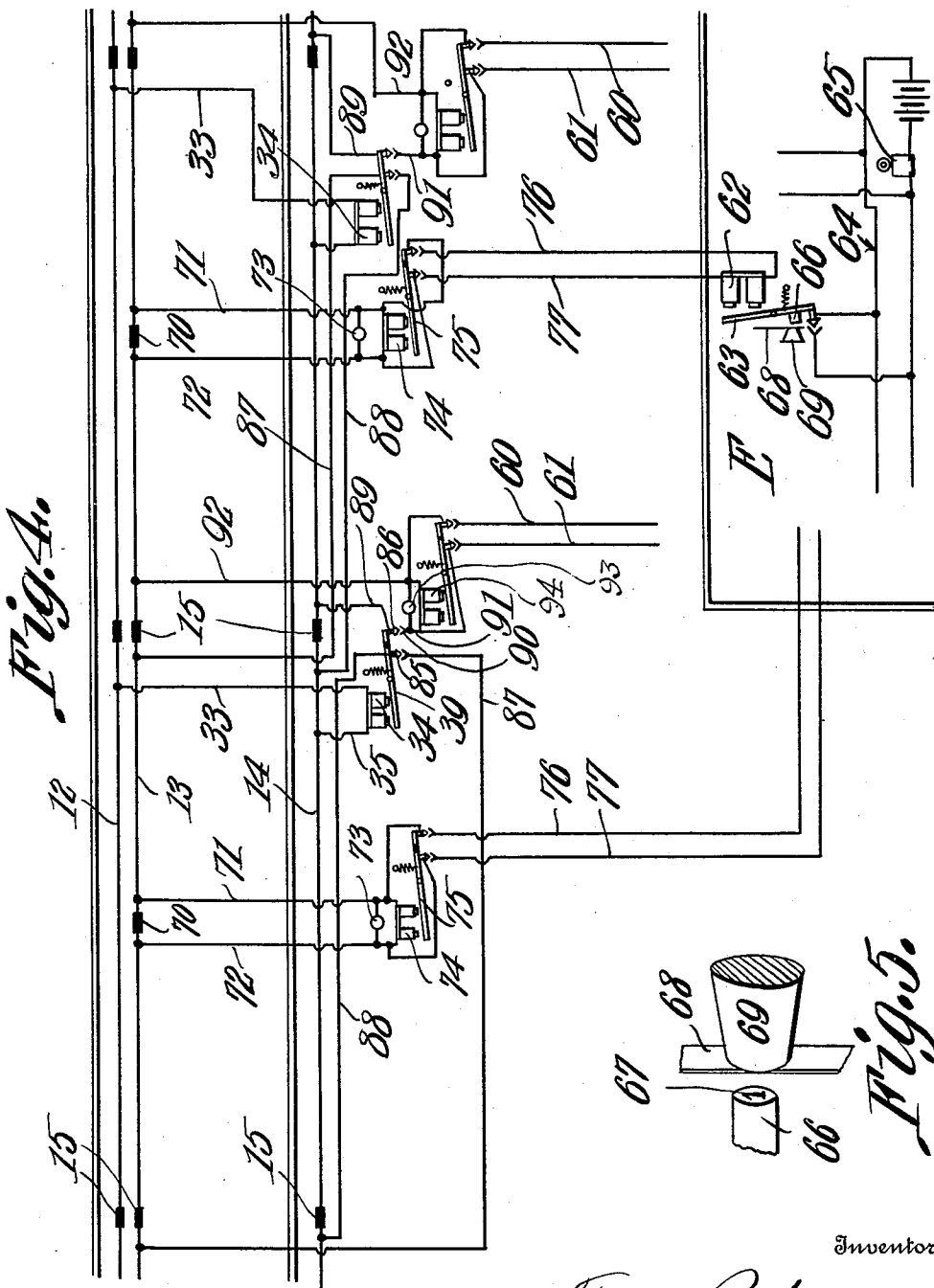


Fig. 4.

Fig. 5.

Witnesses  
 Frank B. Woodrow.  
 C. Walton Brewington.

Inventor  
 Frank Porto,  
 by Amy J. Brewington,  
 Attorney

# UNITED STATES PATENT OFFICE.

FRANK PORTO, OF BALTIMORE, MARYLAND.

AUTOMATIC SIGNAL DEVICE.

1,007,387.

Specification of Letters Patent. Patented Oct. 31, 1911.

Application filed April 27, 1910. Serial No. 558,043.

To all whom it may concern:

Be it known that I, FRANK PORTO, a citizen of the United States, residing at Baltimore city, State of Maryland, have invented certain new and useful Improvements in Automatic Signal Devices, of which the following is a specification.

This invention relates to automatic signaling devices as applicable to a railway block system designed to be operative to stop a moving train or to check the movements thereof, or otherwise warn the engineer, with certainty, whenever a train moves into a track section or block within which a train may be either running or stopped at any given time.

The invention has for its further object to automatically apply the brakes and bring the train to a standstill without any action on the part of the engineer and prevent the train to pass into a block occupied by another train, at the same time notifying the operator in a station or tower of the close proximity of the train.

The invention further consists of certain novel features of construction and combinations of parts which will be hereinafter described and pointed out in the claims.

Figure 1, is a diagrammatic view of an engine equipped with my invention, complete wiring not being shown. Fig. 2, is a diagrammatic view of the system as constructed along the line of way. Fig. 3, is a diagrammatic view of two engines approaching in opposite directions from adjacent blocks. Fig. 4, is a view similar to Fig. 2, but providing further protection to a third train approaching. Fig. 5, is a view in perspective of the mechanism for recording the proximity of two trains within a danger zone.

Referring to the drawings in Fig. 1 is shown in outline a locomotive A having attached thereto, or to the tender as shown a plurality of trolleys B. Located at a convenient point in the locomotive cab is a lamp 1, a bell 2 and a solenoid coil 3, the armature 4 of which normally projects below the coil and has rigidly secured thereto, near its lower end, a laterally extending arm 5, the free end of which is perforated and adapted to slide on a stem 6, weighted toggle levers 7 are connected to the arm 5 and tend to re-

store the parts to normal position after being acted upon by the solenoid. Pivotally connected to the lower end of the core 4 is one arm of a bell crank lever 8, the other arm has connected thereto a valve stem 9 carrying a valve 10, adapted to seat in the dry pipe 11, thus cutting off the supply of steam to the cylinders. It is to be understood that proper connection may be made with the brake valve so that simultaneous with the closing of valve 10 the brakes may be applied. By observing Figs. 2 and 4, it will be seen that conductors 12, 13 and 14 are extended along the line of way. The electrical conductivity of each of the said conductors is broken at intervals by insulation as indicated at 15, thus dividing the length of track in sections or blocks which may be of any desired length.

Referring to Fig. 3, there is shown diagrammatically two locomotives approaching from opposite blocks; said blocks may be for instance designated as C and D. A source of electrical energy is carried by each as indicated by the batteries 16 and 16<sup>1</sup>, and suppose now for illustration that current flows from the positive pole of the batteries 16 on block D through a lead 17, through a magnet 18 (said magnet remaining normally energized as will appear as the description proceeds); thence through a lead 19 to a branch 20, thence through one of the trolleys B, which particular one shall be designated 21, thence through the line conductor 14 to a branch conductor 22, through a lamp 23, through another branch 24 to the line conductor 13 in the next adjacent block, through a trolley 24<sup>1</sup>, a lead 25, through a magnet 26, a branch 27, to a lead 28; where it is supplemented by a current which has been flowing from the battery 16<sup>1</sup>, through a magnet 29, a lead 30, branch 31, trolley 32, line conductor 12 to a branch conductor 33, where the current divides, part flowing along the branch 33, through a magnet 34, branch 35, line conductor 14 to a trolley 36, branch 37, lead 38, back to the battery 16<sup>1</sup>. As hereinbefore stated, the magnet 18 and likewise 29 remain normally closed by reason of the flow of current as just described from the positive pole of the batteries 16 and 16<sup>1</sup> through conductors 17 and 28 respectively, back to the negative side of the respective

batteries, so that as soon as a train enters a block the magnet 34 is energized, whether the adjacent block is occupied by another train or not, and an armature 39 is attracted and places a branch 40 in connection with another branch 41, so that the other part of the current dividing at branch 33 flows through branch 40 and 41 on to line conductor 13 in block D, through a trolley 42, branch 43, magnet 44, to a lead 45, back to the negative side of the battery 16, thus completing the circuit. In this described circuit is included the magnets 26 and 44, the energization of which causes the attraction of their respective armatures 46 and 47, which action closes a circuit in the locomotive located in block C from battery 16<sup>1</sup> through lead 28, a branch 48, a terminal 49, located on one end of the armature 46, a lead 49<sup>1</sup>, through the solenoid 3, a branch 50, lead 38 back to the negative side of the battery 16<sup>1</sup>, the bell 2 being parallel as shown, with the solenoid 3, so that when the solenoid is energized by the flow of current as described, the bell is rung apprising the engineman of the condition, as well as bringing the train to a halt. The magnet 29 is normally energized, as hereinbefore stated, by reason of the flow of current (referring to block C, Fig. 3) from the battery 16<sup>1</sup> through conductor 28, magnet 29, lead 30, branch 31, trolley 32, line conductor 12, branch 33, magnet 34, branch 35, conductor 14, trolley 36, branch 37, lead 38 to the battery 16<sup>1</sup>. So long as this circuit is completed, the armature 51 of the magnet 29 is attracted and a contact point 52 carried by the armature is held in contact with a branch 53 and current flows through a branch 54, contact 52, branch 53, lamp 1, thereby causing said lamp to burn continually, and back to battery; should a break occur in the local circuit of the locomotive said lamp would cease to glow and the engineman would recognize the trouble, whereas should a break occur in the external circuit, for instance in the leads 33, 35, 13 or 14, the magnet 29 would be deenergized and a spring 55 would cause the armature 51 to swing to such a position that a contact point 56 would be brought into engagement with a branch 57, connected to the conductor 49<sup>1</sup>, current would then flow through the solenoid 3 and cause the train to be stopped.

When two trains approach within a danger zone, for instance as shown in Fig. 3, and current is flowing, as described through conductor 22, it will also flow through a magnet 58 cut in parallel with lamp 23, so that the energization of this magnet 58 and consequent attraction of its armature 59 will also cut in parallel with said lamp 23 and magnet 58, through the conductors 60 and 61, another magnet 62 (see Fig. 2, one only being shown, it is to be understood,

however, that one such set is to be supplied for each block) located at a central station E, the energization of the said magnet 62 attracts an armature 63 and thereby closes a circuit 64, local to the said station E and rings a bell 65 therein, thus attracting the attention of an operator. For the purpose of recording a condition as heretofore described, there is provided on each of the armatures 63 a block 66 carrying an impress 67 of some designated character, so that when the armature 63 is attracted by magnet 62, an impression is made on a strip of paper 68 or the like, which is fed across a block 69, as occasion requires.

Located at a point intermediate of the ends of each respective block or it may be found desirable to include more than one there is shown a break 70 in the conductor 13, bridging this break 70 are conductors 71 and 72, which include in parallel a lamp 73 and magnet 74, the armature 75 of this magnet 74 carries contact points similar to the armature 59 of the magnet 58 and when said magnet 74 is energized, as will presently appear, these contact points complete the circuit through conductors 76 and 77 to a signaling and recording device 65 and 66, located in the station E.

Now assuming a train to be in the block C and located as shown in Fig. 3, viz: to the right of the insulation 70 in conductor 13, and another train should enter the same block to the left of the break 70, proceeding of course in the same direction, also assuming the same numerals applicable to the second train, then the circuits may be traced as follows from the battery 16<sup>1</sup> in the train in the right half of the block C, through lead 28, magnet 26, lead 25, trolley 24<sup>1</sup>, to line conductor 13, to branch 71, through magnet 74, branch 72 back to conductor 13 on the left of the insulator 70; thence to the trolley 24<sup>1</sup> attached to the train on the left through lead 25, magnet 26, branch 27, lead 28, branch 54, contact 52, branch 53, branch 50, lead 38, to battery. Current will also flow along lead 28 through magnet 29, lead 30, branch 31, trolley 32, (all located on the train assumed to be on the left end of the block) along conductor 12 to branch 33, through magnet 34, branch 35, line conductor 14, to trolley 36 on the engine on the right end of the block; thence the current will flow through branch 37 and lead 38 to the other side of battery. Thus it will be seen that the magnets 26 in both engines are energized and close the local circuits through the solenoids 3 and stop the trains.

It will here be noted that there are to each engine three effective and three idle trolleys, so that it matters not which direction the trains are moving the connections will be the same, there being magnets 78 and 79 that will take the place of the mag-

nets 26 and 44 respectively, should the relative positions of the engines be changed from that shown in Fig. 3. Means are also provided as shown in Fig. 2, for notifying the operator at the central station what particular block a train is in and furthermore means are provided whereby he may close a circuit and hold the train in any particular block. This means is provided for each block and includes a conductor 80 leading from the line conductor 12, a lamp 81, located in the station E and conductor 82, connected to the line conductor 14, a third branch 83 leads from the line conductor 13 to a point adjacent to the lamp 81 and a switch 84 serves to connect conductors 82 and 83. When a train enters a block the lamp 81 glows for the same reason that the magnet 34 is energized, the flow of current being the same it is deemed unnecessary to repeat the same. Now should the operator desire to stop the train by reason of some trouble in the next block or from any other cause, he closes the switch 84, which completes the circuit through the magnet 26 as can readily be seen and causes the solenoid 3 to act.

In Fig. 4 is shown a slightly modified system in which the armature 39 of the magnet 34 carries two contact points 85 and 86, and these are adapted to contact when the magnet 34 is energized by the presence of a train on that block, the contact 85 with the terminal of a conductor 87, said conductor leading to line conductor 13 of the block, adjacent and for convenience we will assume it to be to the rear, the contact 85 is connected to a conductor 88 leading to line conductor 14 in the block, also to the rear. The other contact 86 is connected to the line conductor 14 by a branch 89, and is adapted to contact with a terminal 90, branches 91 and 92 have in parallel a lamp 93 and magnet 94. It will thus be seen that a train in any particular block automatically protects itself from the front and rear of the dangerous approach of a train similarly equipped. The bridging of the conductors 13 and 14 by this mechanism having the same effect as heretofore described in effecting the energization of the solenoid 3.

Slight changes and alterations might be resorted to in the form and arrangement of the several parts herein described, without departing from the spirit and scope of my invention, hence I do not wish to limit myself to the exact construction as herein set forth; but,

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, bridges including magnets connecting two of said conduc-

tors 12 and 14 in every block, bridges controlled by said magnets connecting conductors 12 and 13 in adjacent blocks, another set of bridges including magnets connecting conductors 13 and 14 in adjacent blocks, recording means in a station controlled by the last mentioned magnets, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

2. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, bridges including magnets connecting two of said conductors 12 and 14 in every block, bridges connecting conductors 12 and 13 in adjacent blocks controlled by said magnets, another set of bridges including magnets connecting conductors 13 and 14 in adjacent blocks, recording means in a station controlled by the last mentioned magnets, means in circuit with the conductors 12 and 14 for indicating when a block is occupied, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

3. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, bridges including magnets connecting two of said conductors 12 and 14 in every block, bridges controlled by said magnets connecting conductors 12 and 13 in adjacent blocks, another set of bridges including magnets connecting conductors 13 and 14 in adjacent blocks, recording means in a station controlled by the last mentioned magnets, means in circuit with the conductors 13 and 14 in every block for controlling a carrier from a station, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

4. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, bridges including magnets connecting two of said conductors 12 and 14 in every block, bridges controlled by said magnets connecting conductors 12 and 13 in adjacent blocks, another set of bridges including magnets connecting conductors 13 and 14 in adjacent blocks, recording means in a station controlled by the last mentioned magnets, means in circuit with the conductors in every block for indicating when a block is occupied and for controlling the carrier from the station, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

5. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, bridges including magnets connecting two of said conductors 12 and 14 in every block, bridges controlled by said magnets connecting conduc-

tors 12 and 13 in adjacent blocks, another set of bridges including magnets connecting conductors 13 and 14 in adjacent blocks, recording means in a station controlled by the last mentioned magnets, an open circuit including a battery and an alarm controlled by said recording means, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

6. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, bridges including magnets connecting two of said conductors 12 and 14 in every block, bridges controlled by said magnets connecting conductors 12 and 13 in adjacent blocks, another set of bridges including magnets connecting conductors 13 and 14 in adjacent blocks, recording means in a station controlled by the last mentioned magnets, an open circuit including a battery and an alarm controlled by said recording means, means in circuit with the conductors in every block for indicating at a station when a block is occupied and for controlling a carrier from the station, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

7. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, one conductor 13 being subdivided, bridges connecting two conductors 12 and 14 in each block, bridges including magnets connecting the sections of the subdivided conductor 13 in each block, recording means located at a station controlled by said magnets, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

8. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, one conductor 13 being subdivided, bridges connecting two conductors 12 and 14 in each block, bridges including magnets connecting the sections of the subdivided conductor 13 in each block, recording means at a station controlled by said magnets, means in circuit with the conductors in each block for indicating when a block is occupied, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

9. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, one conductor 13 being subdivided, bridges connecting two conductors 12 and 14 in each block, bridges including magnets connecting the sections of the subdivided conductor 13 in each block, recording means at a station controlled by said magnets, means in circuit

with the conductors in each block for indicating when said blocks are occupied and for controlling the carrier from the station, and a carrier provided with means for engaging said conductors and a stopping device including a battery connected with said means.

10. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, one conductor 13 being subdivided, bridges connecting two conductors 12 and 14 in each block, bridges including magnets connecting the sections of the subdivided conductor 13 in each block, recording means at a station controlled by said magnets, means in circuit with the conductors 13 and 14 in each block for controlling carriers from the station, and a carrier provided with means for engaging said conductors and a stopping device including a battery, connected with said means.

11. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, one conductor 13 being subdivided, bridges including magnets connecting two of said conductors 12 and 14 in each block, bridges connecting conductors 12 and 13 in adjacent blocks controlled by said magnets, bridges connecting conductors 13 and 14 in adjacent blocks, bridges including magnets connecting the sections of the subdivided conductor 13, recording means in a station controlled by the last mentioned magnets, and a carrier provided with means for engaging said conductors and a stopping device connected with said means.

12. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, one conductor 13 being subdivided, bridges including magnets connecting two of said conductors 12 and 14 in each block, bridges connecting conductors 12 and 13 in adjacent blocks controlled by said magnets, bridges connecting conductors 13 and 14 in adjacent blocks, bridges including magnets connecting the sections of the subdivided conductor 13, recording means in a station controlled by the last mentioned magnets, an open circuit including a battery and an alarm controlled by said recording means, and a carrier provided with means for engaging said conductors and a stopping device connected with said means.

13. A system of the character described, comprising a plurality of conductors 12, 13 and 14 divided into blocks, one conductor 13 being subdivided, bridges including magnets connecting two of said conductors 12 and 14 in each block, bridges connecting conductors 12 and 13 in adjacent blocks controlled by said magnets, bridges connecting conductors

13 and 14 in adjacent blocks, bridges including magnets connecting the sections of the subdivided conductor 13, recording means in a station controlled by the last mentioned magnets, means in circuit with the conductors for indicating when a block is occupied and for controlling the carriers.

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

FRANK PORTO.

Witnesses:

E. WALTON BREWINGTON,  
MARY M. MAGRAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."