A. P. RICKMIRE.

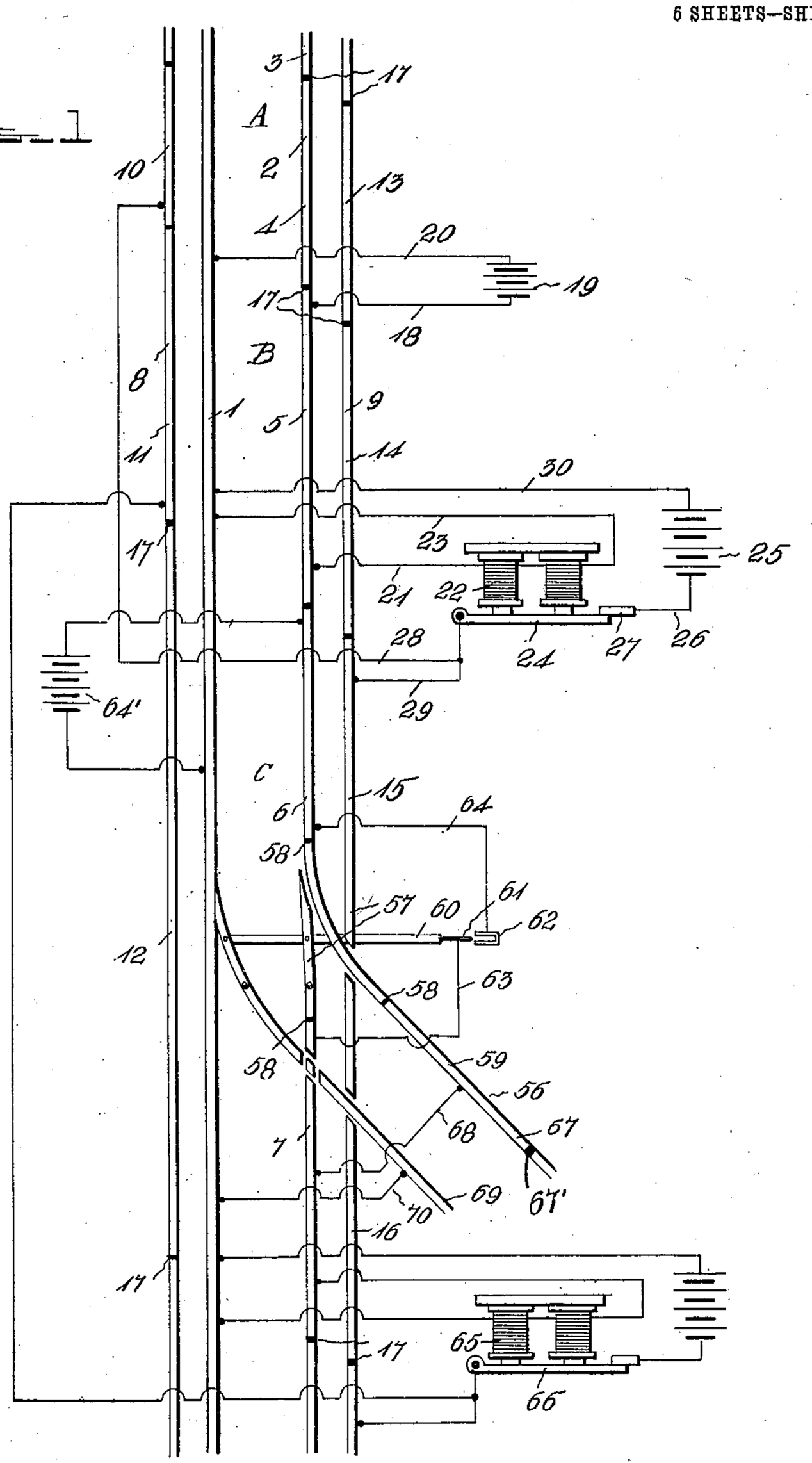
ELECTRIC SIGNALING SYSTEM FOR RAILWAYS.

APPLICATION FILED DEC. 30, 1907.

899,134. Patented Sept. 22, 1908.

5 SHEETS—SHEET 1.

Fig. 1



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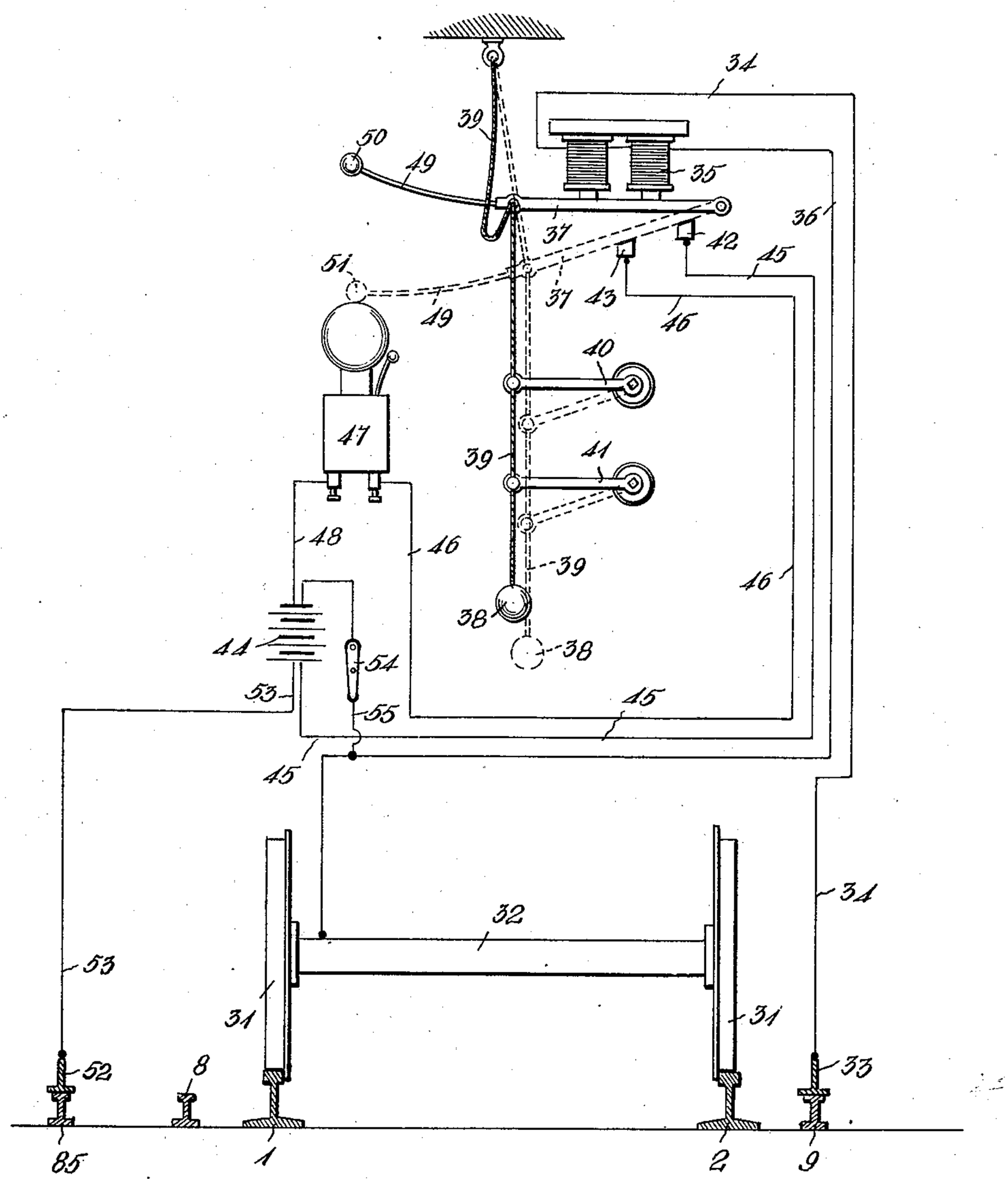
5 SHEETS—SHEET 2.

Fig. 2



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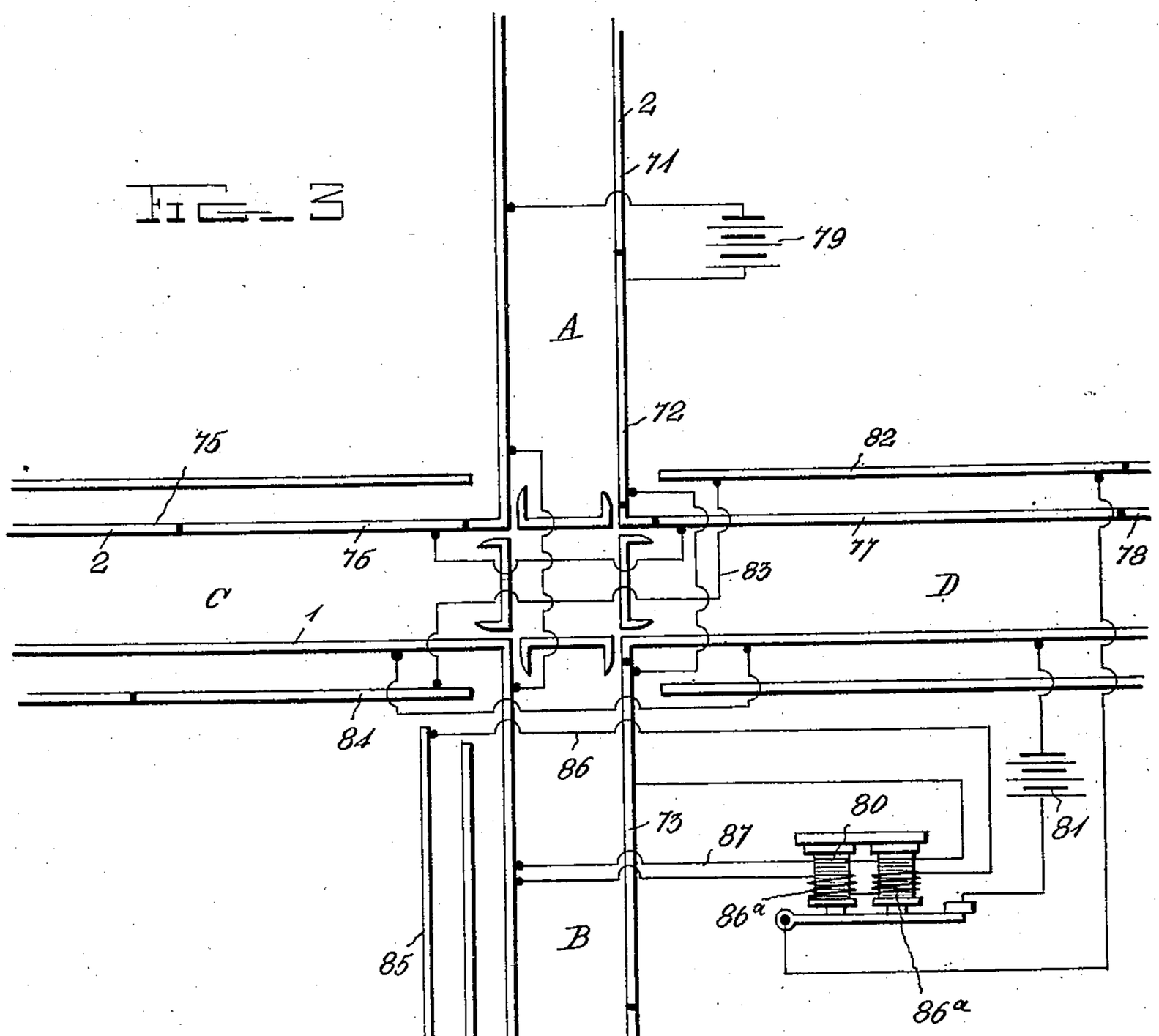
5 SHEETS—SHEET 3.

FIG. 3



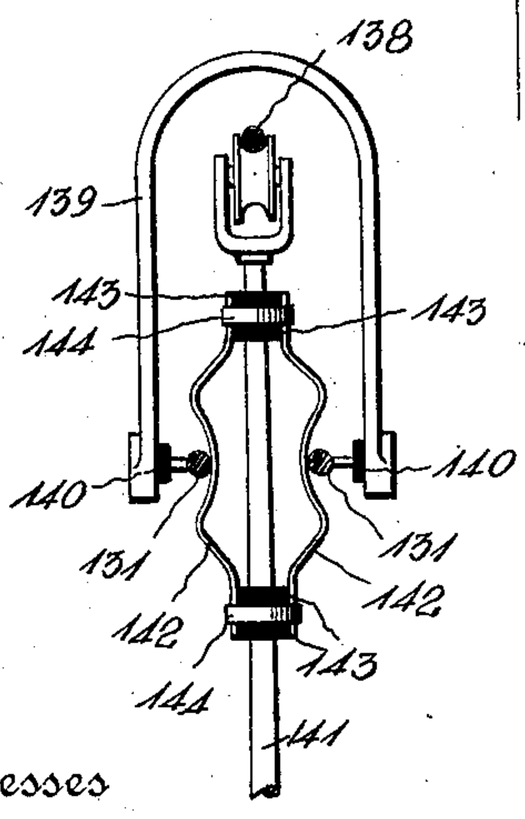


FIG. 5

Witnesses

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5 SHEETS—SHEET 4.

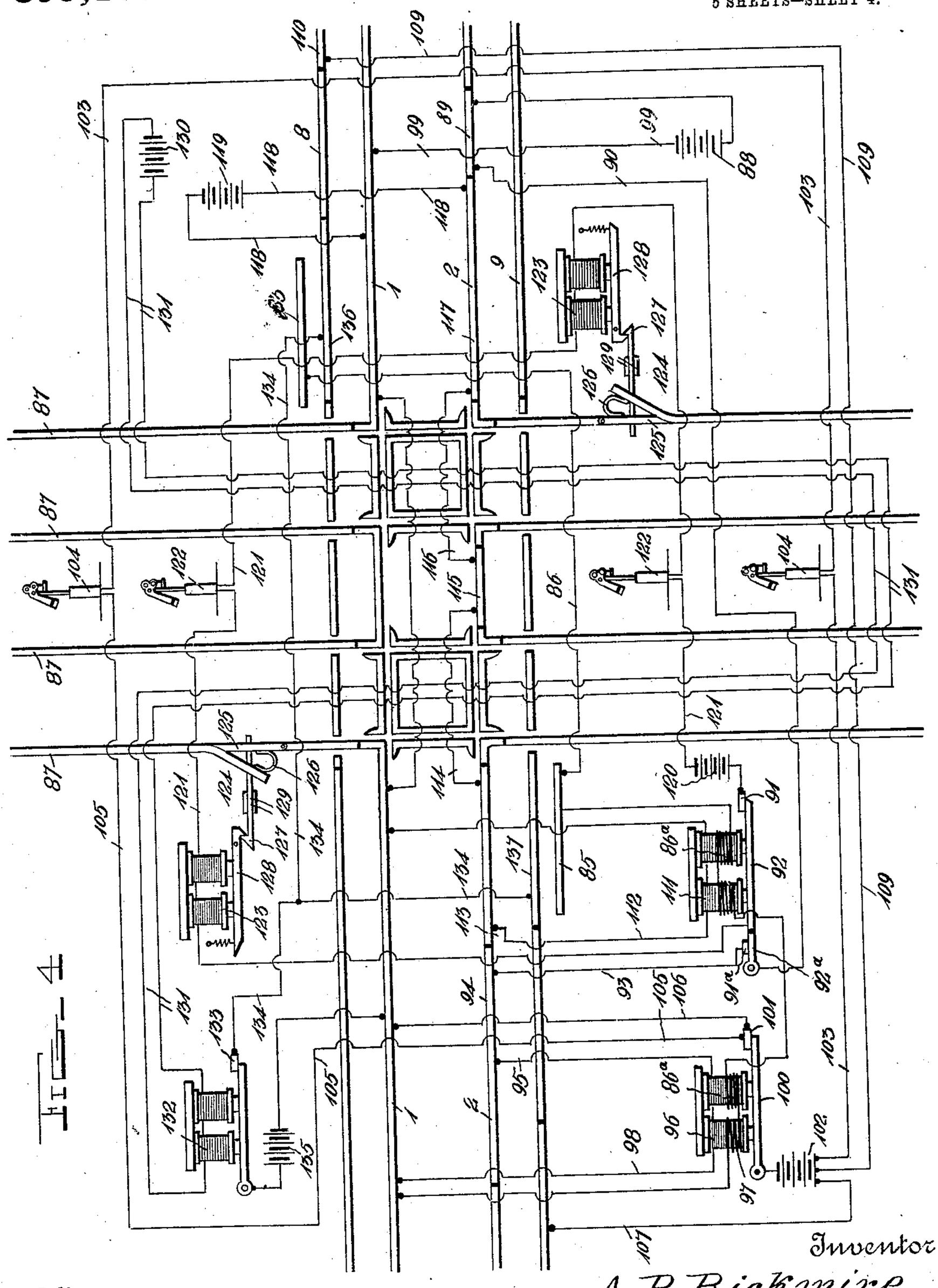

FIG. 4.

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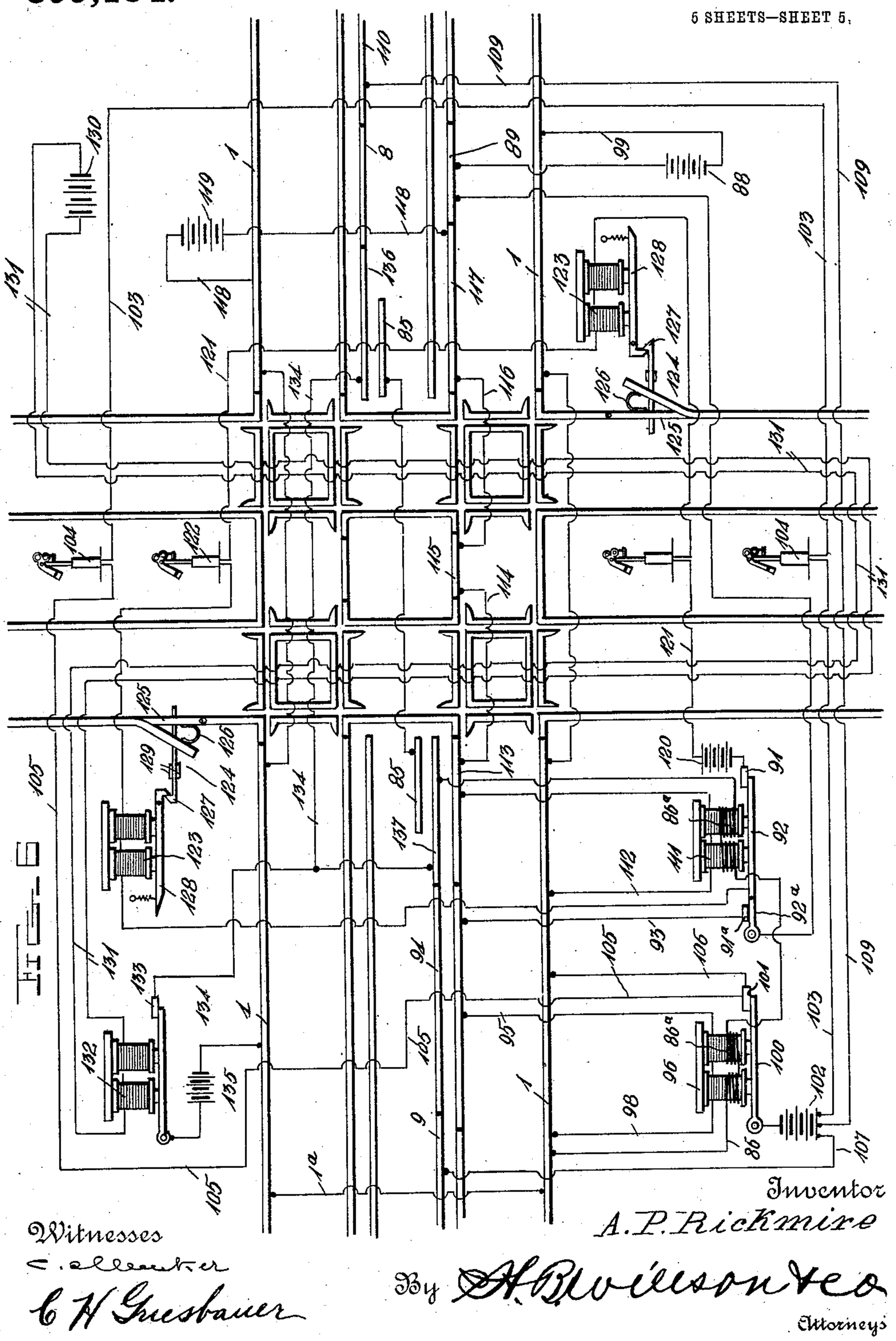
5 SHEETS—SHEET 5.



UNITED STATES PATENT OFFICE.

ARA P. RICKMIRE, OF WATERLOO, IOWA.

ELECTRIC SIGNALING SYSTEM FOR RAILWAYS.

No. 899,134. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed December 30, 1907. Serial No. 408,540.

To all whom it may concern:

Be it known that I, ARA P. RICKMIRE, a citizen of the United States, residing at Waterloo, in the county of Blackhawk and State of Iowa, have invented certain new and useful Improvements in Electric Signal Systems for Railways; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to electric signaling systems for railroads and has for its object to provide a simple and efficient system of this character which will prevent head on and rear end collisions, which will prevent collisions at crossings of electric or steam roads and which will prevent trains from running into open switches.

Another object is to provide means whereby such collisions are prevented by electrically operated devices in the cab of the engine of a moving train which will shut off the steam from the engine, put on the brakes and ring a bell of warning for the engineer.

Another object is to provide means whereby signal lamps and semaphores will be operated at crossings, particularly electric crossings and whereby the electric car will be derailed if the warning of said signal lamp or semaphore is not heeded.

With these and other objects in view the invention consists of certain novel features of construction, combination and arrangement of parts as will be fully explained and particularly pointed out.

In the accompanying drawings, forming part of this specification: Figure 1 is a diagrammatic view of my improved railway signal as applied to a single track railway; Fig. 2 is a diagrammatic view of the mechanism and connections inside the engine cab; Fig. 3 is a diagrammatic view showing a steam railroad crossing equipped with my system; Fig. 4 is a diagrammatic view showing a double track electric road crossing, a single steam track road, the crossing being equipped with my signal system and the electric road being provided with derails; Fig. 5 shows an elevation of a trolley pole provided with conductors for use with my system; Fig. 6 is a view similar to Fig. 4 but showing a double track steam road crossing a double track electric road.

Referring particularly to Fig. 1 there is shown a railway track with an electrically continuous rail 1, the sections of which are suitably bonded to form a continuous electric conductor, and the sectional rail 2 divided into sections 3, 4, 5, 6 and 7 which may be of any number according to the length of the track and the distance apart the trains are to be kept. The rails 1 and 2 comprise the railroad track proper which supports the train. On each side of the track are the auxiliary rails 8 and 9, the rail 8 being divided into blocks 10, 11, and 12, and the rail 9 being divided into blocks 13, 14, 15 and 16. On a double track railway one auxiliary rail will be used for each of the two tracks, in which case the connections would be exactly the same as in Fig. 1 with the omission of either of the auxiliary rails 8 or 9 and their respective electric connections. The different sections of the various rails are insulated from each other in any suitable manner as indicated at 17. Each section of the rail 2 of which the section 5 is an example is connected by a suitable conductor 18 to one terminal of an electric current generator preferably a battery 19, the other terminal 20 being connected to the continuous rail 1. To each section thus provided with a battery and connections is connected by means of a conductor 21, one end of the coil of an electro magnet 22 of a relay, the other end of the coil being connected by means of the conductor 23 to the continuous rail 1, whereby is completed a circuit from the battery 19 through the conductor 18, the rail section 5, the conductor 21, the coils of the electro magnet 22, the conductor 23 the continuous rail 1, the conductor 20 back to the battery 19. The current of this circuit energizes the electro magnet 22, and the electro magnet, when thus energized, draws toward it the pivoted armature 24, whereby one terminal of the battery 25, or other suitable current generators is by means of the conductor 26 the contact 27, the armature 24, and the conductors 28 and 29 connected to the section 15 of the axuiliary rail 9 or section 10 of the auxiliary rail 8. The other terminal of the battery is connected by means of the conductor 30 to the continuous rail 1. When the connections are thus made there is a difference of potential between the sections 15 or 10 and the rail 1 which will cause a current to flow through the suitably arranged apparatus presently to be described. When the

rails 1 and the section 5 are connected by a suitable conductor as the wheels and axle of an engine or car said suitable conductor conducts the current of the battery 19 and thus short circuits the electro magnet 22 of the relay, deënergizing the electro magnet 22 dropping the armature and thus breaking the circuit from the battery 25 to the sections 10 and 15. When this circuit is thus broken it is obvious that there will be no difference of potential between the sections 10 or 15 and to rail 1, to cause the current to flow through the apparatus in the engine cab herein before mentioned.

I will now proceed to describe the apparatus in the engine cab.

Fig. 2 is a cross sectional view of the track just described showing the rail 1 and the sectional rail 2 the auxiliary rails 8 and 9, the wheels 31 and axle 32 of the engine and a diagrammatical representation of the electrical apparatus in the cab. The auxiliary rail 9 is engaged by the contact 33 to which is connected the conductor 34 connecting with the end of the coil of the electro magnet 35. The other end of the coil of the magnet 35 is connected by the conductor 36 to axle 32 and thence through the wheel of the engine to the rail 1, thereby forming electrical connection between the rails 1 and 9 through the coils of the electro magnet 35 to energize said electro magnet and cause it to attract the armature 37 if there be a difference of electrical potential between these rails 1 and 9. When the magnet 35 is deënergized the armature 37 is dropped to the position shown in dotted lines, thereby allowing to lower the weight 38 which will by means of the cord or chain 39 turn the throttle 40 and the brake valve 41, the parts 37, 38, 39, 40 and 41 taking the position shown by the dotted lines whereby the engine will be stopped. When the armature 37 is thus dropped it engages the contacts 42, and 43, thereby completing a circuit from the battery 44 through the conductor 45, the contact 42, the armature 37, the contact 43, the conductor 46, the electric bell 47, the conductor 48 back to the battery 44 whereby when said armature is dropped the electric bell rings, until the armature is restored to the position shown in the solid line. The armature 37 is also provided with an extension 49 with a striker 50 on the end thereof. Said striker rings the gong 51 of the electric bell 47 when the armature falls. There is also provided a shoe 52 which may be let down on the light rail 85—the use of which will appear hereafter. This shoe is by means of the conductor 53, connected to the terminal of the battery 44, the other terminal being connected to a switch by which connection may be made through the conductor 55 to the frame of the engine and thence to the rail 1.

Now will be explained the operation of the system as so far described, after which the more complicated applications will be explained.

A train or engine provided with the connections shown in Fig. 2 will, when in the block C and moving toward the block B, establish the electrical connection from the section 15 through the relay 36 of another train to the rail 1 as has been explained. If the block A is clear, the current of the battery 19 will cause the electro magnet 22 to attract the armature 24 whereby the battery 25 will be electrically connected to the section 15 and the rail 1 so that the current will flow through the relay 36, whereby will be held all the parts 37, 40, and 41 of Fig. 2 in the normal position as in the solid lines. If there be however a train or car in block B the battery 19 will be short circuited as explained, the armatures 24 and 37 will drop, the striker 50 will strike the gong, the electric bell 47 will ring, the throttle will be closed and the brakes will be put on as explained, thus bringing the train to a stand still. If the engine is in the block A, headed toward the block B the shoe 33 will contact the section 10 and the action will be the same. It is thought that this will be understood without further explanation. The blocks A, B, and C are examples and the whole or any number of blocks on the line are to be equipped in like manner.

Now will be described my system as applied to a switch to give warning when the switch is open. In Fig. 1 is shown a side track 56 having any well known or durable switch connected with the main track. At this switch the section 6 has a portion 57 thereof insulated as at 58, said portion being also insulated from the section 6 and from the section 59 of the side track. The switch rod 60 is provided with an electric switch blade 61 adapted to be received by the spaced blade 62. When the track switch is closed electric connection will be made through the blades 61 and 62, the conductors 63 and 64 around the insulated portion 57. When the switch is open electrical connection between the primary battery 64′ of the section 6, and its relay 65 is broken, thus dropping the armature as will be understood. The armature 66 will also be dropped as the result of being short circuited by a train, precisely as explained of the armature 24. The section 67 of the side track 56 is connected by the conductor 68 to the section 6: the rail 69 is connected to the rail 1 by the conductor 70 thus making the side track 56 a part of the block C. The section 67 is insulated from the rest of the rail 59 by insulation 67′. The object of this section and its connections is to prevent side swiping.

Fig. 3 shows my system applied to a railway crossing. The continuous rails 1, 1 are bonded as described of Fig. 1 and are bonded

together, the sectional rails 2—2 are divided into sections 71 to 78 as shown. The usual auxiliary sectional rails are also provided. The battery 79 is connected to the rail 1 and the section 72 and the section 72 is electrically connected to the section 73, as shown. The one end of coil of the relay 80 is also electrically connected to these sections, the other end being connected to the rail 1, as clearly shown and easily understood without further explanation. When these sections 72 and 73 are charged by the battery 79 the armature of the relay 80 is drawn up so as to make electrical connection from one terminal of the battery 81 with the section 82 of the auxiliary rail when either is connected by means of the conductor 83 with the switch 84 on the opposite sides of the tracks, the other terminal of the battery 81 is connected to the continuous rails 1. If a train is in either block A or B the battery 79 is short circuited and connection from the battery 81 with the sections 82 and 84 is broken so that when a train crosses into either section C or D the armature 37 in the engine cab is dropped thus ringing the bell and stopping the engine. If the engineer in block B wishes to signal to the train in either block C or D to proceed, he can lower the shoe 52 upon the light rail 85, whereby connection will be established between the battery 44 in the engine cab and the relay 80 by means of the parts 53, 52, 85, the conductors 86 and the independent coils 86[a], the parts 54, 55, 36, 32, 31, 1 and the conductor 87. The independent coils 86[a] do not have any connection whatever with the other coils of the armature. Such a connection will cause the relay 80 to make connection between the battery 81 whereby the sections 82 or 84 will be charged, the armature 37 raised and the engineer in block C or D notified to proceed.

For the sake of clearness I have omitted the description whereby the engineer in blocks A or B (Fig. 3) is warned of the approach of the train in blocks C and D, but connections are as in Fig. 1 and it is thought may be understood without further explanation.

Fig. 4 represents a double track electric line having continuous rails 87 crossing a single track steam road, having the continuous rail 1 and the sectional rail 2, and the auxiliary rails 8 and 9.

Fig. 6 shows a double track electric road crossing a double track steam road. The description is the same for both figures except that Fig. 6 shows the conductor 1[a] connecting the continuous rails 1—1. The battery 88 has one terminal connected with the section 89 of the rail 2 and the other connected to the continuous rail. The section 89 is connected by the conductor 90 the contact 91[a], the armature half 92[a], the conductor 93, the section 94 of the rail 1, and the conductor 95 to one end of the coil of the electro magnet. The armature has its halves 92 and 92[a] separated by insulation. The other end of the coil of the electro magnet 96 is connected by means of the conductor 98 to the continuous rail whereby the circuit back to the battery 88 is completed by means of the conductor 99. When this circuit is thus completed and there is no short circuit the armature 100 of the relay 97 engages the contact 101, a circuit is formed consisting of the battery 102, the conductors 103, the coils of semaphores 104 to be described, the conductor 105, the contact 101 and the armature 100 back to said battery 102. When the current flows through this circuit the semaphores 104 are set to show that the crossing is clear, and when this current does not flow the danger signal is given. When contact is made between the armature 100 and the contact 101 connection is also made between one terminal of the battery 102 and the rail 1 through armature 100, contact 101 and conductor 106. The other terminal of the battery 102 is connected by means of the conductor 107 to the rail section and by means of the conductor 109 to the said section 110. When the connections are as above described and a train comes into the block of section 108 or 110, the armature 37 in the engine cab will remain in normal position, notifying the engineer that the track is clear. The armature 92 and 92[a] is held in place by the electro magnet 111, which is continually energized by current from the battery 119 over the following path: conductor 118, rail 1 over the jumper wire 1[a] to the rail 1 of the opposite track conductor 112, electro magnet 111, section 113, conductor 114, section 115, conductor 116, section 117 and back to the battery over the conductor 118. This effectually maintains the armature attracted until the section 113 or 117 is bridged by the axle and wheels of a vehicle traveling over the line at which time the magnet is deënergized, thus permitting the armature to fall and disconnect the battery 120 and the conductor 121 from the semaphore circuit.

If there should be a train in the block of section 89 or 94, the battery 88 is short circuited and the armature 100 is dropped, the current in conductor 103 ceases and the semaphores are set at the danger point, then if a train should come in the block of section 108 or 110, because of the broken connection at armature 100, armature 37 in the cab would drop ringing the bell etc., warning the engineer that the track ahead was not clear.

If there should be a train in blocks of section 113 or 117, the battery 119 would be short circuited and the armature half 92 would drop breaking the circuit to relay 97 and thus dropping the armature 100, when the armature 100 was thus dropped the results, would of course be as above described.

When there is contact between the armature half 92 and the contact 91, there is formed a circuit connecting the battery 120, the conductor 121, the coils of the semaphores 122, the coils of the electro magnet 123 of the circuit device. The derailing devices 124 may be of any suitable construction, but as shown, are fully described in my Letters-Patent 789171 issued May 9th, 1905, and hence will be only briefly described here. The switch point 125 is mounted to swing inwardly under the action of the spring 126 but is normally held in position by the hook 127 which engages the hooked end of the pivoted armature 128 when said armature is held against the poles of the electro magnet 123. The hook 127 slides in bearings 129. If there should be a train in the block of section 113, 115, or 117, the battery 119 will be short circuited, the armature half 92 dropped as above described, the semaphores 122 set at danger, and the point 125, moved inward so that an electric car not heeding the danger signal and attempting to cross the track of the steam railroad would be derailed instead of colliding with a steam car.

The semaphores 104 and 122 may be of the construction described in my patent above referred to, or a simple electric lamp may be substituted. If the lamp be used it is obvious that when the crossing was clear the lamp would be lighted and when the crossing was not clear the lamp would be dark. A globe of any color or plain glass could be used. A green globe might be preferable. The signals 104 and 122 may be of the construction fully described in my above named patent and here described briefly as follows: They comprise a swinging arm upon one end of which are two target openings which are adapted to be moved into alinement with a suitable lamp mounted upon a post. One target opening is covered with red glass and is so disposed as to aline with the lamp when the semaphore arm is elevated, the other opening is covered with green glass and alines with the lamp when the arm is lowered. The semaphore may be operated by electro magnet or motor and the arm hangs down when the current is on. In place of the batteries shown any suitable source of current may be used, and if desired the current from the trolley or the electric line could be used to operate the signals 122 and the derail devices. In the place of any of the electro magnets shown, it is obvious that motors of suitable construction could be used. To warn the engineer of the approach and crossing of electric cars the following means is provided: A battery 130 is provided with conductors 131 to a relay 132. When the connections of this battery are not short circuited or incomplete the armature of the relay 21 closes a contact by means of which and the conductors 134 one terminal of the battery 135 is connected to the sections 136 and 137 of the auxiliary rails 8 and 9, the other terminal being connected to the rail 1. When the connections are thus made it will be obvious that the armature 37 in the cab of an engine in the blocks of these sections 136, and 137 will be in normal position notifying the engineer to proceed. If for any reason the battery 130 is short circuited the engineer will be notified by the ringing of the bell etc. Means is provided whereby an electric car crossing the steam track will short circuit the battery 130 thus warning the engineer in the engine cab. It will be noticed that the conductors run down the middle of each track of the electric line for a distance on each side of the crossing. These conductors are close together, spaced and parallel as shown and are conveniently mounted to be connected by suitable short circuiting means carried by the electric car thus short circuiting the battery 130 with the results above mentioned. Any short circuiting means may be used of which I describe only one example. Over the trolley wire 138 (Fig. 5) is a series of suitably supported inverted U-shaped spans 139 adapted to carry on the inner lower ends of its arms the conductors 131 above mentioned. The spans may be of insulating material or the conductors 131 may be mounted on insulating blocks 140. Upon the trolley pole 141 are fastened at both ends, the spring conductor strips 142 adapted to press against the conductors 131. These strips are insulated from the trolley pole by collars 143 of suitable material and are electrically connected to each other by and supported on the insulating collars by conducting collars 144, and rigidly connected thereto, encircling the insulating collars.

On Figs. 4 and 6 is shown also light rails 85 and connections as herein before described but in this case both electro magnets 96 and 111 are provided with independent coils 86^a connected in series. The operation as thus shown is similar to that already described and needs no further description. Instead of connecting the conductors 134 to the auxiliary rails 8 and 9, I may connect semaphores or signal lamps in circuit with the battery 135. These semaphores or signal lamps may be placed any distance desired from the electric track on the side of the steam track to the right of the engineer as he approaches the electric line from either side, respectively. It is of course obvious that this construction could be used at crossings not otherwise equipped with my signal system, thus providing an economically operated and cheaply manufactured signal for the crossings of electric lines over steam railroads.

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

1. In combination in a signaling device a

railroad track comprising an electrical continuous track rail and sectional track rail divided into a plurality of insulated sections, a source of current 64′ having one terminal thereof connected to said continuous rail and the other terminal connected to one of said sections near one end thereof, a relay magnet 65 having one end of its winding electrically connected to said continuous rail and the other end of said winding electrically connected to one of said sections and adjacent to said first named section, a railroad switch situated near the adjacent ends of said adjacent sections, electrical connection between said adjacent sections, an electric switch in said connecting means operatively connecting said electric switch and said railroad switch, an armature for said relay magnet, a contact for said armature, an additional source of current, an auxiliary rail section, a conductor connecting one terminal and one said additional source of current to said continuous rail; the other terminal of said additional source of current being connected to said contact and a conductor between said armature and said auxiliary rail section.

2. In combination with a railway crossing, a track comprising a continuous rail and a sectional rail having inner and outer adjacent rail sections 94 and 113 and an opposite rail section 89 on the opposite side of said crossing from said adjacent rail sections, and an outer rail having an electro magnet, an armature, conductors connecting the ends of the winding of said electro magnet with said continuous rails and said outer adjacent rail sections respectively, a contact for said armature, a source of current and an outer signal, conductors connecting said source of current and said signal in series with said armature and said contact, an inner rail comprising an electro-magnet and a divided armature consisting of outer and inner separately insulated portions, outer and inner contacts for said outer and inner portions respectively, a conductor connecting said inner contact with said outer adjacent rail section, a contact connecting said inner portion with said opposite rail section, a primary source of current having its terminals connected respectively with said continuous rail and said opposite rail section, an inner signal, electrical operating means having a pair of terminals for said inner signal, a conductor connecting one terminal of said inner signal, operating means with said outer contact, a source of current in series with said last named conductor, a conductor connecting the other terminal of said inner signal operating means with said outer portion, and an additional source of current having its terminals connected with said continuous and said inner adjacent rail section.

3. In a signaling system a vehicle, a roadway for said vehicle, movement controlling means for said vehicle, a pair of contacts on said roadway, a source of current having its terminals connected to said contacts, an electro-magnet on said vehicle, means electrically connecting said electro-magnets to said pair of contacts, an armature for said magnet, levers for said controlling means, a weight secured to said levers and a flexible means connecting said armatures to said levers.

4. In a signaling system a vehicle, a roadway for said vehicle, movement controlling means for said vehicle, a pair of contacts on said roadway, a source of current having its terminals connected to said contacts, an electro-magnet on said vehicle, means electrically connecting said electro-magnets to said pair of contacts, an armature for said magnet, levers for said controlling means, a weight secured to said levers and a pair of armature contacts for said armature, a source of current, an electric bell, a conductor connecting said bell with one terminal of said source of current and a conductor connecting said bell with one of said armature contacts, the other of said armature contacts being connected to the other last named terminals.

5. In a signaling system a vehicle, a roadway for said vehicle, movement controlling means for said vehicle, a pair of contacts on said roadway, a source of current having its terminals connected to said contacts, an electro-magnet on said vehicle, means electrically connecting said electro-magnets to said pair of contacts, an armature for said magnet, levers for said controlling means, a weight secured to said levers and a bell striker secured to said armature.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ARA P. RICKMIRE.

Witnesses:
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W. R. JAMESON.