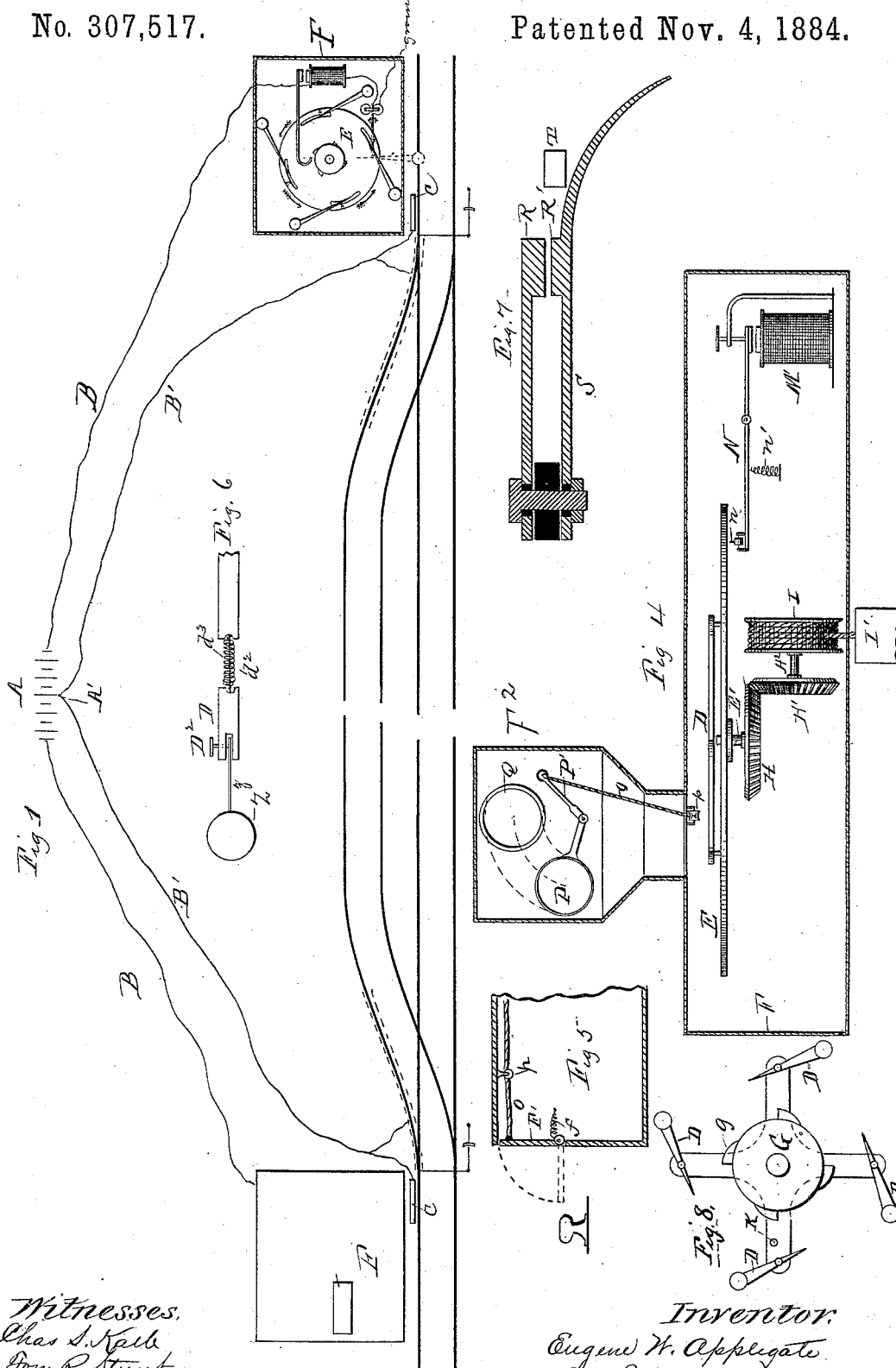


E. W. APPLIGATE.

DETONATING AND VISUAL SIGNAL FOR RAILWAYS.

No. 307,517.

Patented Nov. 4, 1884.



Witnesses,
Chas. S. Kail
Dom R. Stuart.

Inventor,
Eugene W. Appligate
By J. M. Kail attornes

(No Model.)

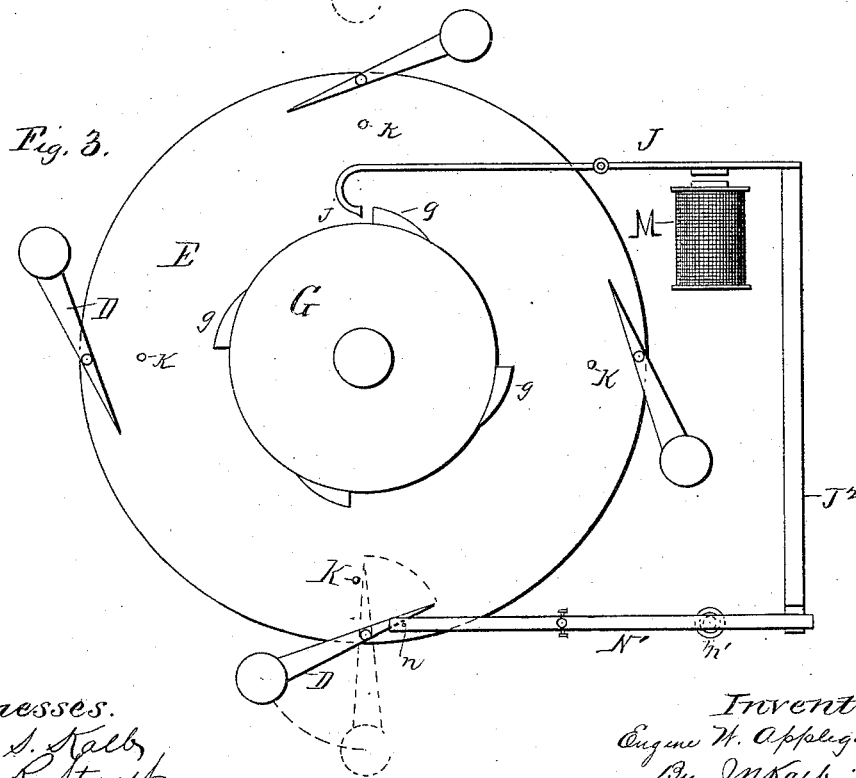
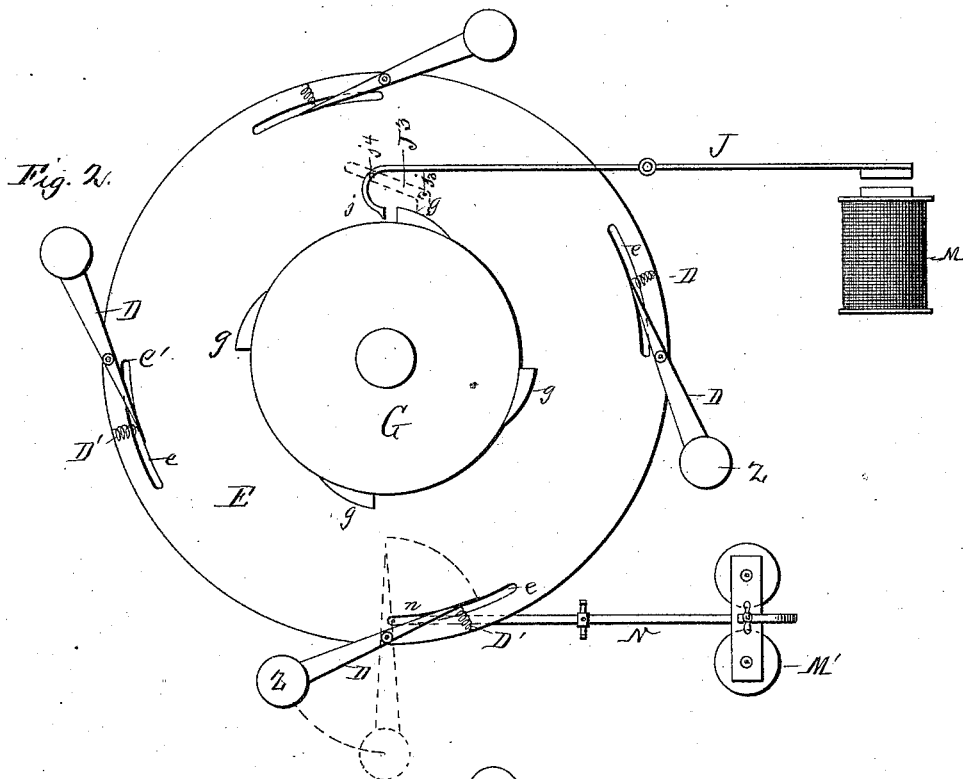
2 Sheets—Sheet 2.

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Chas. S. Kalb,
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Inventor.
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UNITED STATES PATENT OFFICE.

EUGENE W. APPLGATE, OF WASHINGTON, DISTRICT OF COLUMBIA.

DETONATING AND VISUAL SIGNAL FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 307,517, dated November 4, 1884.

Application filed November 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, EUGENE W. APPLGATE, a citizen of the United States, residing at Washington, in the District of Columbia, have made certain new and useful Improvements in Electric Detonating and Visual Signals for Railways, of which the following is a specification.

My present invention relates to devices for giving signals to railroad-trains to indicate that the track is clear, or that it is obstructed by a misplaced switch, a shunted car, or other impediment or obstacle. I apply my devices more especially to switches; but they are applicable to draw-bridges or any other part of a track, and may be used with advantage on block systems. Great certainty is insured and complete protection given to trains approaching from either direction.

In an application filed by me in the United States Patent Office on November 10, 1883, I have shown and described a signal to warn approaching trains of any trouble existing at a switch. I may use the devices there shown in connection with some or all of the devices which form the subject-matter of this application.

The principal part of my present invention consists in a mechanism whereby I am enabled to place a torpedo upon a railroad-rail, in case a switch or draw-bridge is open or any other obstacle is upon the track at these points. My device for doing this work consists, essentially, of a revolving set of arms, which may be caused to turn out and place the torpedoes, which they hold upon the rail of a railroad-track when there is danger ahead, and may be, and are, withdrawn when the obstruction is removed and safety prevails. In connection with the torpedo-box I arrange a visual signal, constructed and combined with said box in such a manner as to be displayed when a torpedo is on the track, and thus form a double alarm to the train in case of danger, and when the torpedo is withdrawn the visual signal will be restored to a condition to indicate "safety." To make the signal complete and render accident to trains approaching from either direction impossible, I place a signal at a distance from each end of a switch or siding, and employ only a single battery, which is located at the depot or other central point.

This battery begins and terminates with the same polarity, and wires from each end run in opposite directions to the signals. The center of the battery has a plate of opposite polarity to the end plates, connected by wires running in opposite directions to the switches at each end of the siding. Thus a circuit can be had from either switch to both signals from the one battery.

The accompanying drawings form a part of this specification, and illustrate what I consider the best means of carrying out my invention.

Figure 1 is a diagram of the switches, battery, and connections. Fig. 2 is a plan of the torpedo device; Fig. 3, a plan of modified form of same. Fig. 4 is a side elevation of the torpedo-box; Fig. 5, a detail showing the falling door; Fig. 6, a detail of torpedo-carrying arm; Fig. 7, a detail of appliance for draw-bridges, &c. Fig. 8 is a plan view of a modification of the means for carrying the pivoted arms.

Similar letters of reference indicate corresponding parts wherever they occur.

I will first describe the means for setting two signals by circuits from the same battery. It will be understood that this part of my invention may be used with any suitable signal, and eminently with that shown and described in my application of November 10, 1883, above referred to, as well as with the particular devices hereinafter set forth.

A is the battery, B B are the lines connecting its ends to the signal-boxes, and B' B' the lines connecting its center plate to the switches at each end of the siding. As shown, the battery begins and terminates with a negative pole or plate, and the center plate, A', to which the lines B' B' are attached, is positive. The switch is provided with a contact-plate, C, alongside of it, which is similar in construction and function to that employed in my application above referred to. It is connected to ground, and is caused to connect ground to line B' when any weight is placed upon it—as, for instance, the switch-rail or a car run off the siding when the switch is closed. The first one or several rails of the siding may be insulated, as described in said previous application, or they may have contact-pieces, similar to C, placed alongside of them, to be pressed down when the tread of the wheel comes upon them. Thus it will be seen that

the line B' is grounded either by a misplaced switch, a car run off the siding upon the plate C, or projecting so far as to be in the way of a passing train. The appliances being the same. 5 at both ends of the siding, either end will be grounded by the mishaps above referred to. Now, when either end is so affected as to give ground to the line B', a current is created from said ground through line B' to battery A (out 10 over both lines B B) to the signal-boxes set at a distance from each switch, through the magnets in said signal-boxes to ground. And by the excitation of the signaling-magnets a danger-signal is given. It will thus be seen that 15 the danger-signal is given at both signal-boxes when anything is wrong at either switch, and that it is done by a single battery located at a central point, as the depot, along the siding.

The signal employed in this invention consists of a torpedo and a visual signal; but 20 either may be employed without the other, or they may be combined to operate together, as hereinafter set forth.

As already stated, I have perfected an automatic device for placing the torpedoes upon 25 the rail when danger is indicated. This is done in such a manner as that one torpedo is set for every danger-signal, and is withdrawn when the danger is removed, and at the next danger-signal a fresh torpedo is set, so that if 30 the previous one shall have been rendered non-explosive by dampness the new one will not be open to this objection. If while the torpedo is set a train comes, it will be exploded, and then if the danger is removed 35 the shell will be removed, so that the track is always clear and ready for a torpedo. The torpedoes marked Z are set in arms D, which are pivoted on the rotating disk or analogous 40 part E. The arms are each provided with a spring, which retracts and holds them in a position to allow the revolution of the part E within the box F. Upon the same shaft with the disk E is a smaller disk, G, which has peripheral projections g, corresponding in number 45 to the number of torpedo-carrying arms. Beneath the disk E, on its shaft E', is a pinion, H, which gears into another pinion, H', on a horizontal shaft, H², on which is placed 50 a drum, I, provided with a cord and weight, I'. The weight is of proper weight or size to insure the certain action of the part. It is wound up in any convenient manner. Against the projections g a hook, j, on the armature J rests, and holds the disks E and G against 55 the action of the weight when the armature is repelled from the magnet or forcibly retracted by the spring j'; but when the magnet M is excited by the passage of a current of electricity the armature J will be caused to release 60 the engagement of j and g, and the force of the weight I', through the gearing H H', will rotate the disks G and E, and they would continue to rotate as long as the current continued, but for the devices which project the 65 torpedo upon the track, which will now be

described. For this purpose (placing the torpedo upon the rail) I may employ either of two constructions, both of which are alike in principle and in the essentials of construction, 70 but differ in minor details, as will be seen.

In the form shown in Fig. 2 I employ a second magnet, M', which is in circuit with magnet M, and will be energized in conjunction therewith. This magnet M' is provided with 75 an armature, N, having a pin, n, which lies under the disk E and out of contact therewith when the magnet is inert, (as the armature is retracted by the spring n';) but when the magnet is energized the pin n on the armature N 80 is caused to bear against the under side of the disk E. At the same time the disk will be rotated by the withdrawal of the hook j from contact with the projection g, consequent upon the passage of a current through M. Now 85 the disk E will be revolved over the pin n until the segmental slot e is reached, when the pin n will be caused to rise through said slot. The arm D lying over the slot will come in contact with the pin, and being pivoted, as 90 before described, will be caused to change its position and assume one on or near a parallel line with the radius of the wheel or disk E. As shown, this will throw the torpedo-bearing 95 end of the arm out and bring the torpedo upon the rail, to be exploded by a passing train. The pin n reaching the end e' of the slot e will overcome the action of the weight I' and stop the disk. As soon as the circuit is opened again, the spring n' will withdraw the pin n, 100 and the action of the weight will again cause the disk to revolve; but the armature J, being retracted by spring j' when the circuit is opened, will protrude its nose or hook j into the path of the projection g and prevent the further 105 revolution of the disk; but a little time is allowed between the withdrawal of pin n and the engagement of parts j and g to allow the wheel E to revolve sufficiently to turn the slot e off from the pin n, and thus obviate the possibility of the pin again catching in the same slot. This is accomplished by setting the projection g upon the disk G in such positions 110 as that when the disk E is stopped by the protruding pin n a small distance shall exist between the hook j and the projection g, as shown in Fig. 2. This small distance also insures 115 that when the current is cut off the hook j shall get properly back into line for engagement with projection g before the disk G shall have rotated so far as to take the face of the projection g beyond the point of the hook j. 120 Certainty of action is insured in this way. As soon as the pin n is withdrawn so as to come below the under edge of the arm D, the spring D' will restore the arm to its normal position for revolution within the box F. This will be 125 done whether the torpedo has been exploded or not. The torpedo is held in the end of the arm D by means of a pinching-screw, D², which takes hold of the tin or other tag or tail, z, of the torpedo Z, and the torpedo will be with- 130

drawn with the arm whether it be exploded or not, and thus the track will be kept clear for the succeeding torpedo.

In the form of torpedo-placer seen in Fig. 3 I employ only one magnet M, and dispense with the segmental slots *e*. The armature J is provided with an extension, J², which has a beveled end, j², which moves back and forth under the lever N', which I have here substituted for the armature N, before used. The pin *n* projects downward from the lever N', which lies over the disk E, and the pin *n* is held out of contact with the arm D by the spring n'. When the magnet M is energized, the bevel j² projects under the end of the lever N' and throws the pin *n* down into the path of the arm D, and the revolution of the disk E will cause the arm D to be thrown out to place the torpedo upon the track, as before. The movement of the disk is stopped by the arm D coming in contact with the pin K on the disk E, where it will be held until the pin *n* is withdrawn from arm D. The disk E may be replaced by arms radiating from the shaft E', on which the torpedo-carrying arms are placed, instead of upon the disk, as shown in Fig. 8, Sheet 1. The disk G may be stopped by means of a second hook operated by the armature J. This is shown in dotted lines in Fig. 2, where J³ represents the hook pivoted at j³ to any suitable fixed point or support, and at j⁴ is pivoted and connected to armature J, so that it will be pushed in when hook j is withdrawn and withdrawn when hook j is pushed in.

In order to render the device capable of withstanding shocks, the tail *z* of the torpedo may be made long enough to allow the lateral motion of the torpedo to be taken up by the bending of said tail; or the arm D may be made extensible and compressible, and the tail *z* only relied upon to take the vertical strain. To thus render the arm adjustable, I provide at some convenient point in its length between the torpedo end and the pivot a rod, *d*², which is held in the two parts of the rod by heads within the said rods, and the parts of the arm are held expanded by a spiral spring, *d*³, surrounding rod *d*². This gives capacity for being compressed by the twisting and jamming occasioned by a train, and prevents any shock being transmitted to the device beyond the short portion of arm outside the rod *d*².

The entire device is incased in the box F, which is provided in front with the door F', hinged on its lower edge, and provided with a gentle spring, f', for closing it. The force of the torpedo-arm, as it is projected outward by contact with the pin *n*, will be sufficient to knock the door down and hold it down as long as the arm is extended. When the door F' is knocked down, it lies over against the side of the rail, as shown in Fig. 5, and thus affords a means for guiding the torpedo properly upon the rail.

In connection with the torpedo-signal I ar-

range a visual signal operated in conjunction therewith. This is shown in Fig. 4. A cord, O, is secured to the door F', and, running over pulleys *p p*, is attached to one end, P', of a pivoted signal, P. This visual signal P is placed in a small box, F², set upon box F, which is provided with a lamp, Q. The signal P is of colored glass, and when it covers the face of the lamp Q danger will be indicated. This signal will cover the lamp at the same time that the torpedo is placed upon the track-rail. The torpedo-carrying arm D, being thrust out to place the torpedo on the rail, knocks the door F down, by the falling of which the cord *o* is drawn and caused to depress the end or arm P' and elevate the signal over the lamp Q, and thus indicate danger in this manner. The colored glass or signal P will remain displayed as long as the torpedo-carrying arm D holds the torpedo on the rail, which, as before seen, will be as long as the cause of the danger remains. As soon as the track is cleared and the arm D swings back into the box the door F' will be closed by the spring f', aided by a draw upon the cord *o*, which is occasioned by the overbalanced signal P causing the end P' to be thrown up. This will bring the door F' to a closed position, and will at the same time prevent the possibility of the cord *o* being caught and held by the door coming shut faster than said cord is taken up. The end P' is set at an angle to the opposite end of the rod which holds the signal P in order to insure its proper action. If it were in right line therewith when the signal is upright, there would be less tendency to resume its "safety" position.

The device I use on draw-bridges consists of the contact-points R R', insulated from each other, and connected to battery and torpedo box or signal, as shown in Fig. 7. The lower point, R', is set upon the spring S, which bears against a portion of the draw-bridge T when the latter is in place, and is thereby held so as to disconnect the points R R'; but when the draw-bridge is not in place the spring S throws the points R R' together and creates a circuit through torpedo-box, which will cause the signal to be given and a torpedo placed upon the rail.

Having thus described my invention, what I claim is—

1. A revoluble pivoted arm for carrying a torpedo, in combination with an armature and magnet arranged to stop the revolution of the arm and cause it to place a torpedo in position for explosion when the magnet is energized, as set forth.

2. A series of torpedo-carrying arms pivoted upon a revoluble frame or disk, in combination with said frame or disk, and a magnet and armature provided with a pin to engage with the arms and cause them to place a torpedo in position for explosion, as set forth.

3. A series of torpedo-carrying arms pivoted upon a revoluble disk or frame, in combina-

tion with said disk or frame, which is provided with a stop for each arm, and a magnet and armature arranged and operated to throw an arm out for placing a torpedo when a current shall be created through the magnet, and holding the arm in this position until the current is broken.

4. In a device for placing torpedoes, a series of torpedo-placing arms pivoted upon a revolvable frame or disk, in combination with said frame or disk, and lugs or projections *g*, corresponding in number with the pivoted arms, an armature operated to engage said projections, and thereby hold the frame or disk while there is no current, and release the same when there is a current, as set forth, and means for causing the pivoted arms to place a torpedo in position for explosion.

5. The combination, with the disk or frame *E*, the arm or arms *D*, pivoted thereon, and a spring, *D'*, for each arm *D*, to keep it withdrawn, of the armature and magnet to overcome the action of the spring and protrude the arm, substantially as set forth.

6. In a torpedo-placer, the combination, with the torpedo-carrying arm and means for pro-

truding it to place a torpedo, of the door *f*, hinged at its base and adapted to be thrown down by the arm and to lie flush with and guide the torpedo into position upon the rail, as set forth.

7. The combination, with a torpedo-carrying arm, means for operating it, and a door which is thrown down by said arm, of a signal, *P P'*, and connecting-cord *O*, secured at one end to the signal *P P'*, and at the other to the door, whereby the throwing down of the door actuates the signal *P P'*, as set forth.

8. A battery beginning and terminating with the same polarity, said poles being connected to separate signals, and connections from points on a railroad affixed to a plate of opposite polarity in the center of the battery, whereby an interference at any point so connected will cause both signals to be given, as set forth.

In testimony whereof I have hereunto set my hand.

EUGENE W. APLEGATE.

Witnesses:

I. N. KALB,

WM. HELMICK.