

(No Model.)

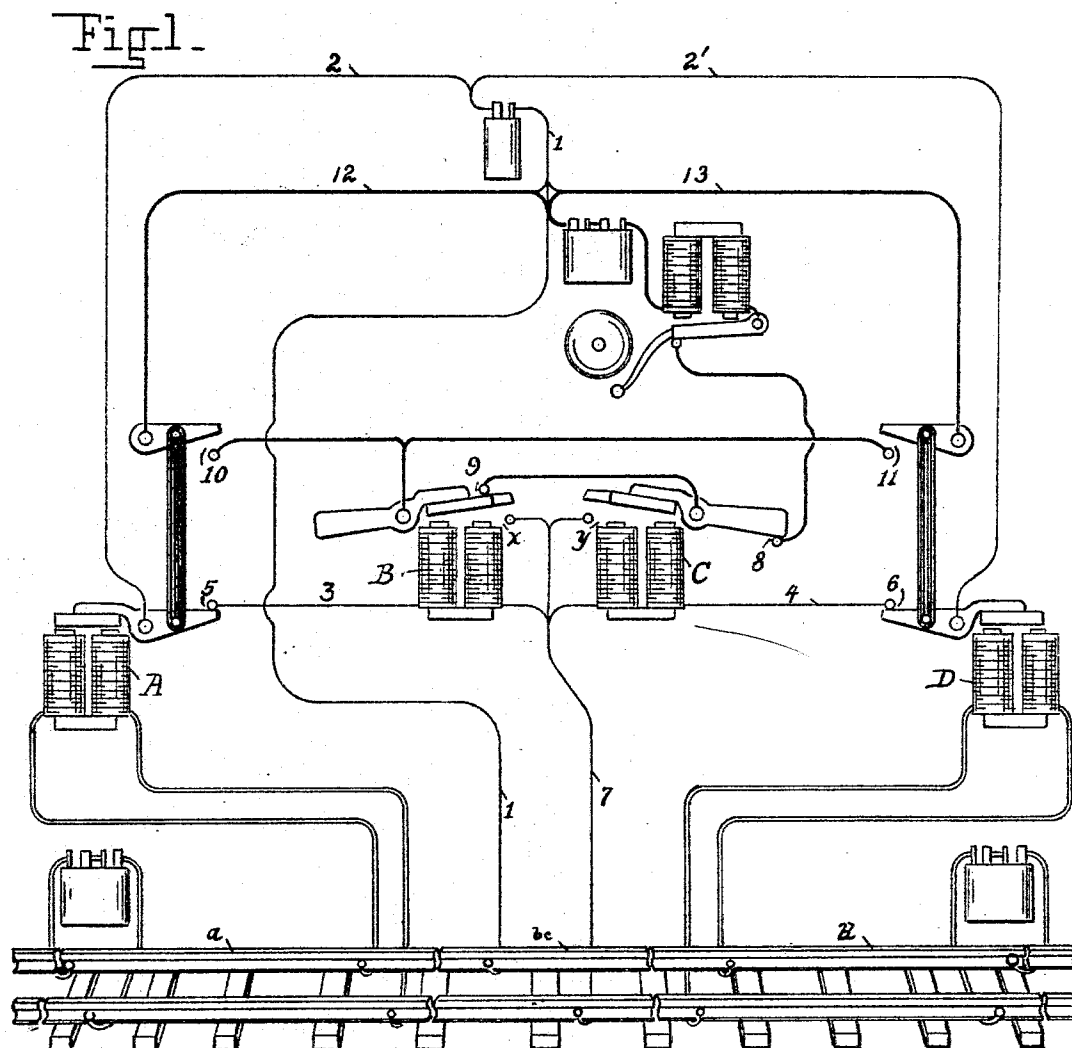
2 Sheets—Sheet 1.

A. J. WILSON.

ELECTRIC ALARM SYSTEM FOR RAILWAY CROSSINGS.

No. 515,638.

Patented Feb. 27, 1894.



Witnesses:

Samuel W. Balch.
Chas. P. Breese

Inventor,

Adoniram J. Wilson,
by Thomas Ewing, Jr.
Attorney.

A. J. WILSON.

ELECTRIC ALARM SYSTEM FOR RAILWAY CROSSINGS.

No. 515,638.

Patented Feb. 27, 1894.

Fig. 2.

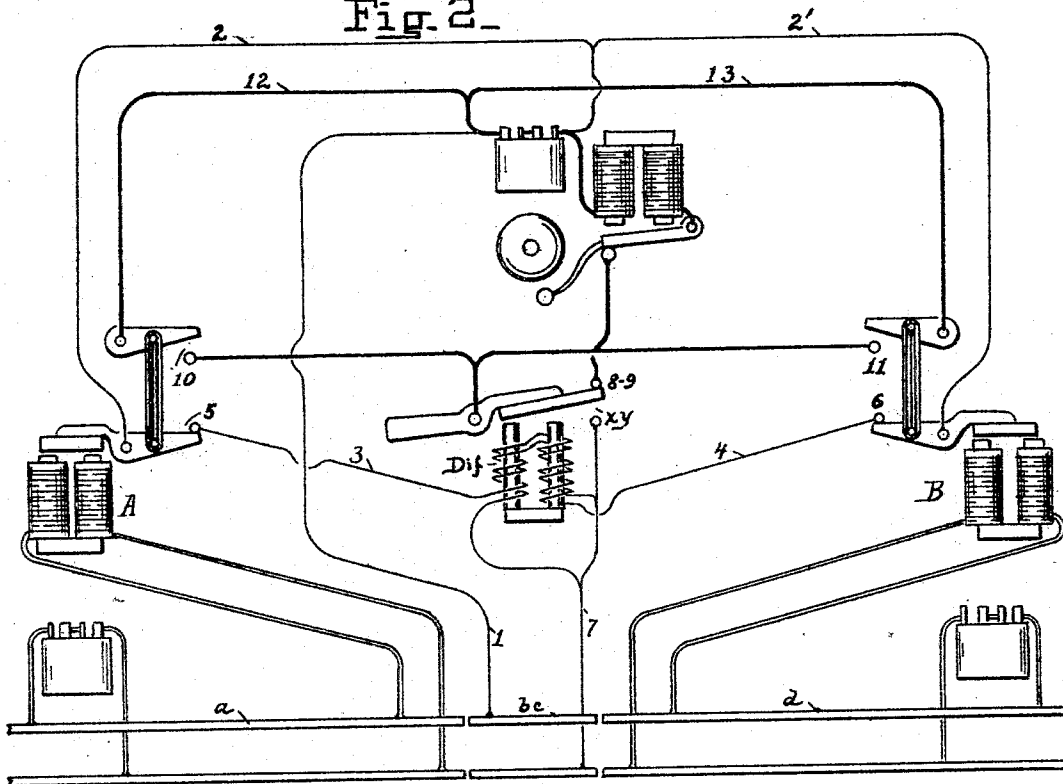
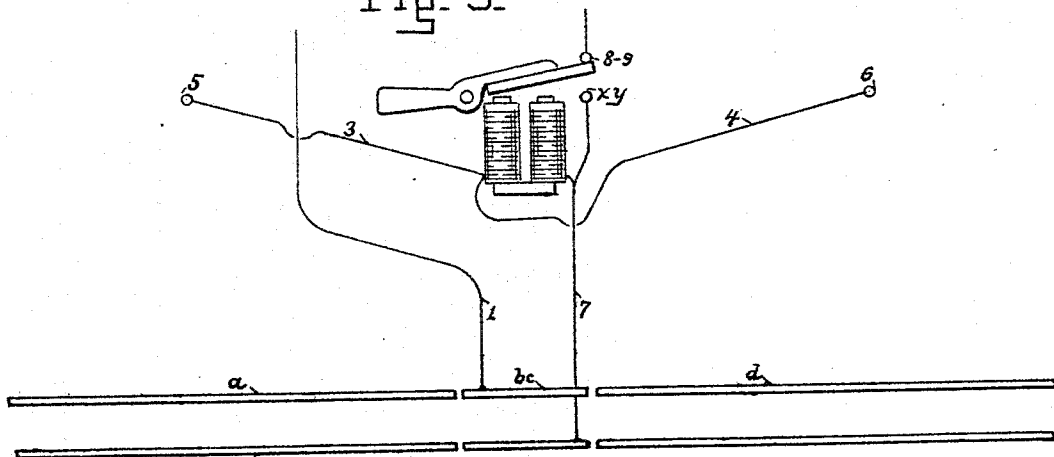


Fig. 3.



Witnesses:

Samuel H. Balch.

Chas. P. Bruce

Inventor.

Adoniram J. Wilson

by Thomas Ewing, Jr.
Attorney.

UNITED STATES PATENT OFFICE.

ADONIRAM J. WILSON, OF PORT CHESTER, ASSIGNOR TO THE HALL SIGNAL COMPANY, OF NEW YORK, N. Y.

ELECTRIC-ALARM SYSTEM FOR RAILWAY-CROSSINGS.

SPECIFICATION forming part of Letters Patent No. 515,638, dated February 27, 1894.

Application filed April 25, 1893. Serial No. 471,776. (No model.)

To all whom it may concern:

Be it known that I, ADONIRAM J. WILSON, a citizen of the United States of America, residing at Port Chester, county of Westchester, State of New York, have invented certain new and useful Improvements in Electric-Alarm Systems for Railway-Crossings, of which the following is a specification.

The object of my invention is to cause the operation of a signal, *e. g.* the ringing of a bell, at a railway crossing, as a train approaches and passes it from either direction, whether the track ahead be cleared, or there be another train ahead which has passed the crossing but is still within the range of the signal system.

My invention consists essentially in a system in which there are three insulated track-sections all independent of each other, one lying on either side of the signaling point, and one (preferably a short section) lying at the signaling point. Whenever all tracks of the system are cleared the whole system comes immediately into normal condition, and closing either end-section will cause the signal to operate; and if both end-sections be closed together, in any condition of the system, the signal will operate, but the closing of one end-section and the middle section together, the other section being open, sets up such condition of the system as prevents the operation of the signal except upon simultaneous closing of both end sections. Closing the middle section never causes the signal to operate in any condition of the system, but, as stated, may prevent it from being operated.

My invention further consists in a signal operating system in which there are (a) three insulated track sections, (b) two magnets, each connected with one of the end-sections and not in any way dependent upon the rest of the system. These magnets (as shown) are normally magnetized but each is demagnetized when the section with which it is connected is entered by a train. And (c) one or two magnets in a two branch circuit, each branch connected with the middle section and including a contact controlled by the armature of one of the end-section magnets. This middle section circuit (as shown) is normally open and the circuit is such that to close either branch the middle section must be

closed while the corresponding end-section magnet is magnetized.

My invention further consists in a system like the foregoing in which the signal (*e. g.* bell) circuit is such that the signal is operated at any time when both branches of the middle section circuit are open and one or both of the end-section magnets are demagnetized, but not when either branch of the middle section circuit is closed or both of the end-section magnets are magnetized.

My invention further consists in certain details hereinafter more fully described and claimed.

The signal shown is a bell and the system will be described as including and operating a bell. But other signals may be substituted therefor.

In the accompanying drawings which form a part of this specification, Figure 1 is a diagram of one form of my system in which two relay magnets are used. Fig. 2 is a diagram of modifications in which I use a single differential magnet instead of the two relay magnets of Fig. 1. Fig. 3 is a detail diagram of a part of the circuit of Fig. 2 showing how a single ordinary magnet can be substituted in place of the differential relay magnet of Fig. 2.

In the drawings the end-section magnet circuits are shown in double lines, the signal circuits are shown in single heavy lines, and the middle section circuits are shown in single light lines.

The form shown in Fig. 1 will first be described. Magnets A and D, herein called end-section magnets, are each connected with an end track section, A with *a* and D with *d* as shown, and they are normally magnetized by the current from the end-section batteries. When a train enters either of these sections the battery thereof is short circuited through the car wheels and axles, and the armature of the corresponding end-section magnet drops. This occurs independently of the condition of the rest of the system as the drawings clearly show. The four magnets A B C and D are so connected that when A is demagnetized B cannot be magnetized and when D is demagnetized C cannot be magnetized, and this irrespectively of the condition of the rest of the system. This is because the wires which connect these magnets with the battery of the

signal circuit connect with the armatures of A and D which are out of circuit when dropped. Magnets B and C can neither of them be magnetized except by closing track-section *b c*, but when B is once magnetized it will so continue so long as A is magnetized and D is demagnetized, even when the track-section *b c* is opened, and when C is once magnetized it will so continue so long as D is magnetized and A is demagnetized, even when the track-section is opened. This appears from the circuits of B and C which are as follows: Track-section *b c*, wire 1, battery, wire 2, contact 5, wire 3, magnet B, wire 7, (a circuit which will be broken at contact 5 if A is demagnetized, and at the track-section *b c* if this be opened;) and parallel circuit through wire 1, battery, wire 2', contact 6, wire 4, magnet C, wire 7, (a circuit which will be broken at contact 6 if D is demagnetized, and at the track-section *b c* if this be open.) Suppose, the system being in normal condition, a train enters track-section *a*. The armature of A drops breaking contact 5. This produces no change in the other magnets. It closes the signal circuit, battery, signal, contacts 8, 9, and 10, and wire 12. This circuit, as will be clear, is closed when B and C and A are all demagnetized and is broken if any one of the three be magnetized. A parallel signal circuit, closed when B C and D are magnetized, is: battery, signal, contacts 8, 9, and 11 and wire 13. These are the only signal circuits and it therefore appears that the signal will operate when B, C and A or B, C and D, or all four of the magnets, are demagnetized, but not otherwise. C is thrown into another circuit which is independent of track-section *b c* to wit: battery, wire 2, contact 6, wire 4, magnet C, contact *y*, contacts 9 and 10 and wires 12 and 14. This circuit is closed, as will be seen, so long as D is magnetized and A is demagnetized, and the bell will not ring while the system is in that condition. But when the train passes on to section *d*, if it overlaps *a* and *d* the bell will ring again, whether section *b c* be actually closed or not. For so long as sections *a* and *d* are closed magnets A and D are demagnetized and B and C are therefore demagnetized and when all four are demagnetized the bell rings. But when the train has passed off from section *a*, leaving it clear, and overlaps sections *b c* and *d*, A will be remagnetized, and D and therefore C, demagnetized. And B will be magnetized by a current through the circuit, to wit, section *b c*, wires 1 and 14, battery, wire 2, contact 5, wire 3, magnet B, wire 7. Its armature will be drawn up and the bell circuit broken at contact 9.

Contact *x* will be closed and close the following circuit, to wit, magnet B, contacts *x* and 11, wire 13, battery wire 2, and contact 5, and wire 3, which is independent of section *b c*. Therefore no change occurs when the train passes off of section *b c* and on to section *d*. The bell is still silent, its circuit being broken at contact point 9. If a follow-

ing train now enters *a*, magnet A and with it magnet B are demagnetized, and the bell rings. But if no following train enters section *a*, when the train under discussion leaves section *d*, magnet D is remagnetized drawing its armature up and breaking contact 11. Magnet B is therefore demagnetized and drops its armature, and the system is in normal condition. It will be seen that there is a two branch shunt around the connection between the middle section and the magnets B and C, to wit, first branch, wire 12, contact point 10, contact point *x*, and second branch, wire 13, contact point 11, contact point 9, contact point *y*. Similar shunts are shown in Figs. 2 and 3. If the train is going in the opposite direction it first enters section *d*, causing magnet D to drop its armature. This closes the signal circuit at contact 11 and rings the bell. When the train enters section *b c* magnet B is momentarily magnetized breaking the bell circuit at 8, but is immediately demagnetized as soon as the train enters section *a*. The bell now rings until the train draws off from section *d* leaving *d* clear, but overlapping sections *a* and *b c*. Magnet C is then magnetized, and by closing contact *y* throws itself into a circuit independent of section *b c*. The bell circuit is broken at contact 8 and this contact remains open until the train leaves section *a*, or a following train enters section *d*.

In the modification of the foregoing shown on Sheet 2 of the drawings herein, but one battery is used to replace the battery in the middle section circuit and the signal circuit battery of Fig. 1. And the number of magnets and contact points is reduced. Magnets B and C of Fig. 1 are at no time both magnetized nor is the operation of the system ever dependent on their being in different conditions. Therefore they can be consolidated. This can be done as in Fig. 2 by substituting a differential magnet "Dif." for the magnets B and C of Fig. 1. In this diagram the contacts *x y* perform the function of contacts *x* and *y* of Fig. 1. They might be consolidated in Fig. 1. Contacts 8 and 9 of this diagram perform the function of contacts 8 and 9 of Fig. 1. The differential magnet is magnetized when one of the branches is open and the other is closed. Otherwise the system acts exactly as that of Fig. 1 except that closure of the middle section when the other two sections are open would cause equal and opposite currents to traverse this differential magnet, and its armature would not be attracted, whereas in Fig. 1 under the same conditions both magnets B and C would be magnetized. In this latter respect the operation of the system when arranged as in Fig. 3 is like that of Fig. 1 and unlike that of Fig. 2. Otherwise the arrangement of Fig. 3 is an entire and exact equivalent of that of Fig. 2. The two branch shunt around the connection between the middle track section and its magnet (Fig. 2) similar to the two branch shunt around

the magnets B and C of Fig. 1 above described is—first branch—the wire leading from the battery to the left to contact point 10, thence to the armature of the differential magnet, thence through contact point $x y$,—and second branch—the wire leading from the battery to the right to contact point 11, thence to the armature of the differential magnet, thence through contact point $x y$. Of the parts which comprise this two branch shunt, only the contact point $x y$ and the armature appear in Fig. 3. I have illustrated these three forms merely to show that, while it is necessary to have a two branch circuit connected with the middle section and to have a magnet in each branch, it is immaterial whether there be a separate magnet for each branch or a single magnet in the two branches and whether this single magnet be an ordinary or a differential magnet.

I use the term "operated" relatively to the magnets, not in the sense of "magnetized," but in the sense of being changed from the condition which the magnet is in when the tracks are clear and the system normal, to the opposite condition. In the system shown the end section magnets are normally magnetized and when "operated" are demagnetized, and the middle section magnet or magnets are normally demagnetized and when "operated" are magnetized. In like manner the expression "operative condition" is applied to circuits to indicate that condition of the circuit which results in any magnet included within the circuit being "operated" in the sense just stated.

Without limiting myself to the precise details shown, what I claim is—

1. A railway signal system consisting of three track sections in line, a magnet for each track section, a signal, and connecting circuits which embrace means for operating the signal when either end track section is occupied if the system is otherwise in normal condition, means for operating the signal when both end sections are occupied in all conditions of the system, and means for preventing the operation of the signal when but one end section and the middle section have been occupied and the middle section is then cleared, substantially as described.

2. A railway signal system consisting of three track sections in line, a magnet for each track section, a signal, and connecting circuits which embrace means for operating the signal when either end track section is occupied if the system is otherwise in normal condition, means for operating the signal when both end sections are occupied in all conditions of the system, means for preventing the operation of the signal when but one end section and the middle section are occupied, and means for continuing the signal in the inoperative condition when the middle section is then cleared, substantially as described.

3. A railway signal system consisting of three track sections in line, a magnet for each

track section, a signal, and connecting circuits which embrace means for operating the signal when either end section is occupied if the system is otherwise in normal condition, means for operating the signal when both end sections are occupied in all conditions of the system, means for preventing the operation of the signal when both end sections are cleared, means for preventing the operation of the signal when but one end section and the middle section are occupied, and means for continuing the signal in the inoperative condition when the middle section is then cleared, substantially as described.

4. In a railway signal system the combination of three independent track-sections in line, a magnet for each section, the middle-section magnet being incapable of operation when both end-section magnets are operated, a signal circuit in the operative condition when the middle-section magnet is not operated and an end-section magnet is operated, substantially as described.

5. In a railway signal system the combination of three independent track-sections in line, a magnet for each section, a two-branch circuit through the middle-section magnet, each branch of which is controlled by one of the end-section magnets and the middle track-section jointly, and a two-branch signal circuit, each branch of which is controlled by the middle-section magnet and one of the end-section magnets jointly, substantially as described.

6. In a railway signal system the combination of three independent track-sections in line, a magnet for each section, the middle-section magnet being incapable of operation when both end section magnets are operated, a two branch shunt around the connection between the middle-section and its magnet each branch of which is controlled by the middle-section magnet and one of the end-section magnets jointly, and a signal circuit in the operative condition when the middle-section magnet is not operated and an end section magnet is operated, substantially as described.

7. In a railway signal system the combination of three independent track-sections in line, a magnet for each section, the two end-section magnets being each independent of the rest of the system and the middle section magnet being in a circuit which can be closed only when but one of the end section magnets is operated, and a signal circuit in the operative condition only when the middle section magnet is out of circuit and an end section magnet is operated, substantially as described.

8. In a railway signal system the combination of three independent track-sections in line, a magnet for each section, the two end-section magnets being each independent of the rest of the system, a two branch circuit through the middle-section magnet, either branch being controlled by the middle track-

section and one of the end-section magnets jointly, the middle-section magnet being in circuit only when but one of the end-section magnets is operated, and a two branch signal circuit each branch of which is controlled by the middle-section magnet and one of the end-section magnets jointly, substantially as described.

9. In a railway signal system the combination of three independent track-sections in line, a magnet for each section, the two end-section magnets being each independent of the rest of the system, a two-branch circuit through the middle-section magnet either branch being controlled by the middle track-section and one of the end-section magnets jointly, the middle-section magnet being in circuit only when but one of the end-section magnets is operated, a two-branch shunt around the connection between the middle section and its magnet, each branch of which is controlled by the middle section magnet and one of the end-section magnets jointly, and a signal circuit in the operative condition only when the middle-section magnet is not operated and an end-section magnet is operated, substantially as described.

10. In a railway signal system the combination of three independent track sections in line, a magnet for each section, the two end-section magnets being each independent of the rest of the system and the middle section magnet being in a circuit such that this magnet can be operated only when the middle section is occupied and but one of the end section magnets is operated, and a signal circuit in the operative condition only when the middle section magnet is not operated and one or both of the end section magnets are operated, substantially as described.

11. In a railway signal system the combination of three independent track sections in line, a magnet for each section, the two end

section magnets being each independent of the rest of the system, a two branch circuit through the middle section magnet, each branch being controlled by the middle section magnet and one of the end section magnets jointly in such manner that the middle section magnet can be operated only when the middle section is occupied and but one of the end section magnets is operated, and a two branch signal circuit in the operative condition only when the middle section magnet is not operated and one or both of the end section magnets are operated, substantially as described.

12. In a railway signal system the combination of three independent track sections in line, a magnet for each section, the two end-section magnets being each independent of the rest of the system, a two branch circuit through the middle section magnet either branch being controlled by the middle track section and one of the end section magnets jointly in such manner that the middle section magnet can be operated only when the middle section is occupied and but one of the end section magnets is operated, a two branch shunt around the connection between the middle section and its magnet, each branch of which is controlled by the middle section magnet and one of the end section magnets jointly and is in the operative condition only when the middle section magnet and one of the end section magnets are operated, and a signal circuit in the operative condition only when the middle section magnet is not operated and one or both of the end section magnets are operated, substantially as described.

Signed by me, in Chicago, Illinois, this 21st day of April, 1893.

ADONIRAM J. WILSON.

In presence of—

S. MARSH YOUNG,
W. W. SALMON.

It is hereby certified that in Letters Patent No. 515,638, granted February 27, 1894, upon the application of Adoniram J. Wilson, of Port Chester, New York, for an improvement in "Electric-Alarm Systems for Railway-Crossings," errors appear in the printed specification requiring correction as follows: In line 112, page 2, the word "contacts" should read *contact*; line 113, same page, the word "perform" should read *performs*; line 115, same page, the words and figures "Contacts 8 and 9" should read *Contact 89*, and same line, the word "perform" should read *performs*; and that the Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 13th day of March, A. D. 1894.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.