

(No Model.)

R. J. M. DANLEY.
RAILWAY CROSSING PROTECTOR.

No. 482,422.

Patented Sept. 13, 1892.

Fig. 1.

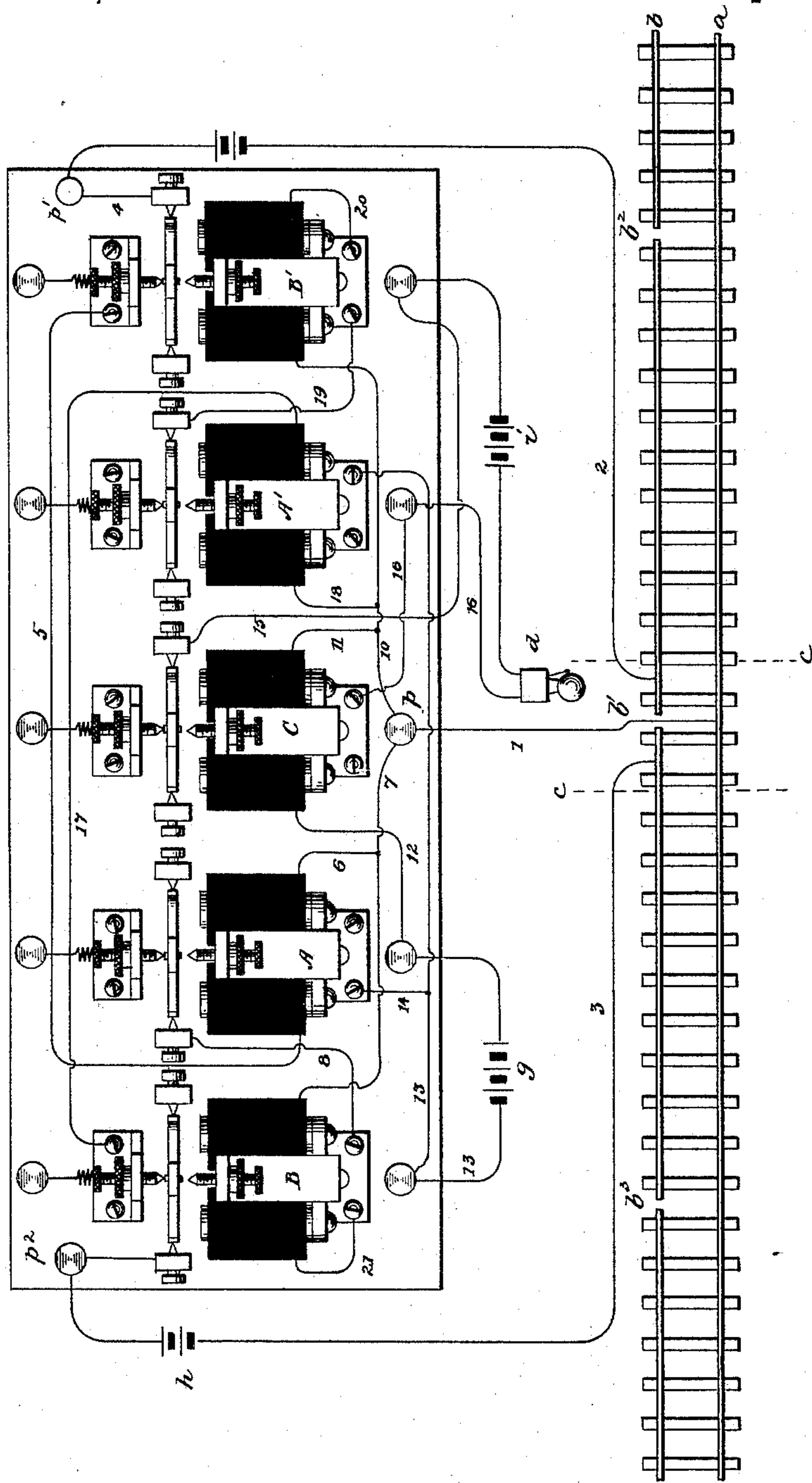
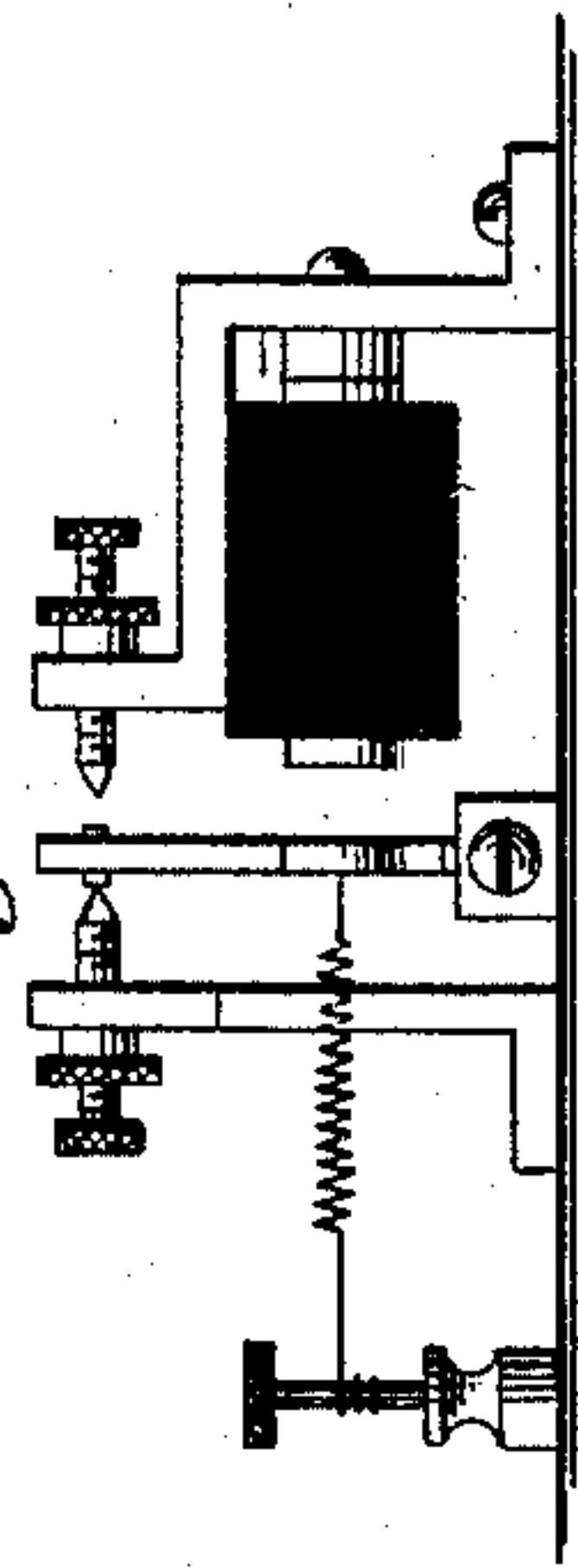


Fig. 2.



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RAILWAY-CROSSING PROTECTOR.

SPECIFICATION forming part of Letters Patent No. 482,422, dated September 13, 1892.

Application filed March 2, 1892. Serial No. 423,447. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. M. DANLEY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Railway-Crossing Protectors, of which the following is a specification.

My invention relates to an automatic electrical apparatus for sounding an alarm or closing a gate at a highway-crossing of a railroad on the approach of a train.

The object of the invention is to provide an apparatus for this purpose which is specially adapted for single-track railways on which trains run in both directions and in which a single set of instruments may perform the operations for trains moving in both directions.

It is a further object of the invention to provide an apparatus which when the train has passed the crossing will cause the bell to stop ringing or the gate to open and at the same time will not prevent the operation of the bell or gate by another train entering the block before the first one has left it.

The invention consists of the combinations of relays, alarm apparatus, and connections with the rails of a railroad, which are hereinafter pointed out and claimed.

In the accompanying drawings, Figure 1 represents a plan view of the apparatus and circuits constituting my invention; and Fig. 2 represents the form of relay utilized.

a b represent, respectively, the rails of a single-track railway. A highway-crossing is indicated by the dotted lines *c c*. At the crossing is located an alarm-bell *d* or an electrically-operated gate which it is desired to operate automatically by trains as they approach the crossing.

The drawings show a bell only; but that is sufficient to explain the principal of my invention.

At any suitable place near the crossing is located a series of five relays A, B, C, A', and B'. These are all mounted upon the same base and suitably housed and protected from the weather.

Four batteries *f g h i* are located near and connected in the relay and bell circuits, as will hereinafter be described.

One of the rails of the track at the crossing

is broken, as indicated at *b'*, and the ends insulated from each other and at suitable distances from this point in each direction. 55 Other breaks *b² b³* are made in the same rail. These points *b²* and *b³* are located a half-mile, more or less, from the crossing at the points where it is desired the trains shall start the bell to ring. The rail *a* is electrically continuous. The circuits from the rails to the base upon which the relays are mounted are as follows: Rail *a* is connected by wire 1 to post *p*, the right-hand section of rail *b* is connected by wire 2 through battery *f* to post *p'*, and 65 the left-hand section of rail *b* is connected by wire 3, through battery *h* to post *p²*. The other circuits will be traced in reciting the operation. The relays may be of any preferred construction. 70

The operation is as follows: When a train approaching the crossing from the right reaches the point *b²*, a circuit is completed through the wheels and axles as follows: insulated rail-section, wire 2, battery *f*, post *p'*, 75 wire 4, armature of relay B', back stop of same, wire 5, coils of relay A, wire 6, wire 7, post *p*, wire 1, rail *a*, and completed through the wheels and axles. This energizes relay A, which attracts its armature and completes 80 a circuit through the relays C and B, as follows: from armature of relay A by wire 8, frame of relay B, wire 21, coils of said relay, wire 7, post *p*, wires 10 and 11, coils of relay C, wire 12, battery *g*, wire 13, wire 14, through 85 frame and front stop of relay A, and completed through its armature. Relays C and B thereby being energized, the former closes the circuit, which operates the bell or the gate as follows: from its armature by wire 90 15, battery *i*, through the bell or gate, wire 16, through the frame of the relay, and completed through the armature. The bell will continue to ring as long as any of the wheels of the train are on the right-hand insulated section, because the circuit of relay A is closed during that 95 period. As soon, however, as the last wheel crosses the point *b'* the circuit of relay A is immediately broken, and that is followed by the opening of the circuit of relay C, which 100 stops the bell or opens the gate. If, however, another train following the first passes the point *b²* before or any time after the first has passed the point *b'* the relay A will become

or continue to be energized and hold the circuit of relay C closed, thus continuing the ringing of the bell as long as there is a train between the points b^2 and b' . When a train approaches from the left and passes into the block from the point b^2 , the circuit of relay A' is completed in the same manner as the circuit of relay A, to wit: left insulated rail-section, wire 3, battery h , post p^2 , armature and back stop of relay B, wire 17, coils of relay A', wires 18 and 10, post p , wire 1, rail a , and completed through the wheels and axles. Relay A' will then act in the same manner upon relays C and B' as relay A acted upon C and B by closing a circuit through them, as follows: armature of relay A', wire 19, frame of relay B', wire 20, coils of said relay, wires 10 and 11, coils of relay C, wire 12, battery g , wire 13, frame of relay A', and completed through its armature. The bell will then ring as before until the train passes the point b' , when it will cease to ring. Now with the circuits as so far described it would appear that when a train had passed from one side of the point b' to the other the bell would continue to ring or the gate would remain closed by reason of the circuit of one of the relays A and A' remaining closed—that is to say, as A and A' both act upon C in the same manner it makes no difference which way the train is going so long as the circuit is completed through one of them. The function, therefore, of the relays B B' is to make the bell cease ringing or open the gate as soon as the train has passed the point b' . This is done by making the points of the relays B and B' control, respectively, the circuits of the relays A' and A. The armatures of the relays are normally all against their back stops, and the coils of relay A' are included in the circuit of battery h , which leads through the armature and back stop of relay B, and the coils of relay A are in the circuit of battery f , which leads through the armature and back stop of relay B'. Now when the relay A completes the circuit of relay B the latter breaks the circuit of A' and simultaneously attracts its armature to its front stop, where a circuit through itself is completed by the wheels and axles of the train

as soon as it passes the point b' , and that circuit is held closed until the train is entirely out of the block, thus preventing the relay A' from acting upon the alarm-relay. The circuit of relay B when thus closed is: the left insulated rail, wire 3, battery h , post p^2 , armature of B, front stop and frame, wire 21, coils of B, wire 7, post p , wire 1, rail a , and completed through the wheel. The relay B' acts upon relay A in exactly the same manner and under the same conditions, the circuits being easily traced on the drawings.

Having thus described my invention, I claim—

1. A single-track railway-signal consisting of the combination of an alarm or gate, two sets of relays respectively operating said alarm or gate for trains coming in both directions, and two other relays controlling said two sets of relays, respectively, to make them inoperative when a train has passed the alarm or gate, substantially as described.

2. The combination, with an alarm or gate for highway-crossings of railroads, of a relay, as C, operating the alarm or gate, two other relays, as A A', each controlling the first relay, a fourth relay, as B, controlling the circuit of one of the said two relays A A', and two insulated sections of track in circuit, respectively, with the relays A A', one of the sections being in circuit with the said fourth relay B, for the purpose set forth.

3. The combination, with two insulated track-sections extending in opposite directions from a crossing, two relays, as A A', in circuit with the respective sections, an alarm-relay, as C, controlled by said two relays, and two other relays, as B' B, controlling the circuits, respectively, of said two relays A A', the relays B' B also being included in circuit with the respective track-sections, for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT J. M. DANLEY.

Witnesses:

JOHN FIELD,
GEO. N. COLE.