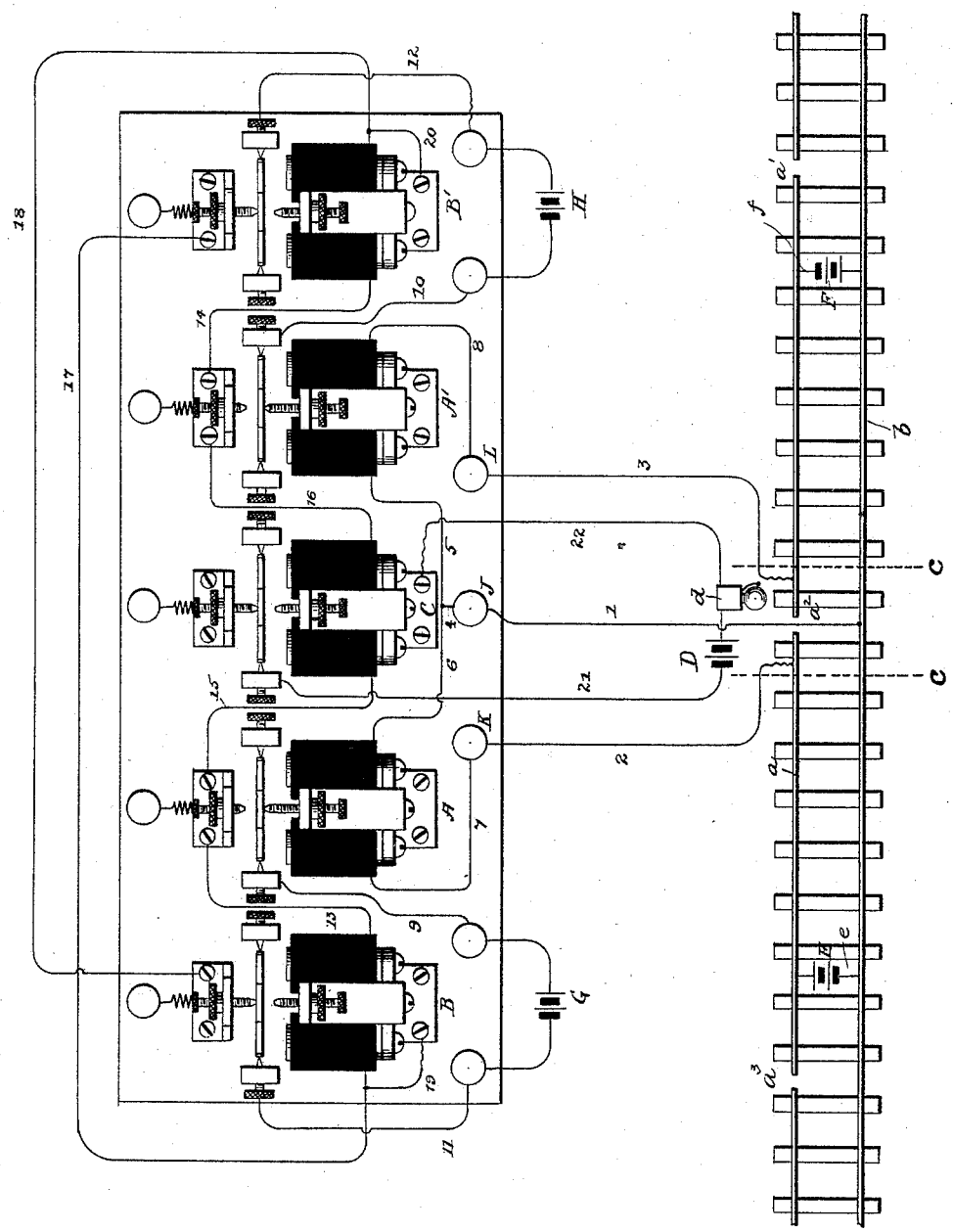
(No Model.)

R. J. M. DANLEY.

RAILWAY CROSSING PROTECTOR.

No. 482,423. Patented Sept. 13, 1892.



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RAILWAY-CROSSING PROTECTOR.

SPECIFICATION forming part of Letters Patent No. 482,423, dated September 13, 1892.

Application filed April 20, 1892. Serial No. 429,877. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. M. DANLEY, a citizen of the United States, residing in 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 it 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 apparatus or gate and connections with the rails of a railroad, which will be described and claimed hereinafter.

The particular invention herein claimed is a modification of that claimed in my application, Serial No. 423,447, filed March 2, 1892.

In the accompanying drawing the figure represents a plan view of the apparatus and circuits constituting my invention.

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 drawing shows a bell only; but it is sufficient to explain the principle 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.

Three batteries H, G, and D are located near and connected in the relay and bell circuits, as will hereinafter be described.

One of the rails at the crossing is broken, as indicated at a^2, and the ends insulated from each other and at suitable distances from this point in each direction. Other breaks a' a^3 are made in the same rail. These points a' and a^3 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 ringing. The rail *b* is electrically continuous.

The circuits from the rails to the base upon which the relays are mounted are as follows: Rail *b* is connected to post J by wire 1. The right-hand section of rail *a* is connected to post L by wire 3, and the left-hand section is connected to post K by wire 2. Each of the insulated rail-sections is connected with the continuous rail *b* by the respective wires *f* and *e*, which include batteries F and E, respectively.

The other circuits will be traced in reciting the operation, which is as follows: The circuits of the relays A A′ are normally closed through the batteries E and F, respectively, the circuit of relay A being from one pole of the battery E to the left insulated section, thence by wire 2 to post K, wire 7, coils of the relay A, wire 6, wire 4, post J, wire 1, rail B, wire *e*, and the other pole of the battery. The circuit of the relay A′ is from one pole of battery F to right insulated rail-section, wire 3, post L, wire 8, coils of the relay A′, wire 5, wire 4, post J, wire 1, rail B, and wire *f* to the other pole of the battery. When a train approaching the crossing from the right reaches break a', the current of the battery F is shunted through the wheels and axles of the train, thereby deenergizing relay A′ and allowing its armature to be pulled to its back-stop. This completes a circuit as follows: armature of relay A′, wire 10, battery H, wire 12, armature and back-stop of relay B′, wire 17, coils of relay B, wire 13, back-stop of relay A, wire 15, coils of relay C, wire 16, and complete through the back-stop and armature of relay A′. The current of battery H thereby energizes relays B and C, which immediately attract their armatures. The armature of C closes a circuit through the frame of the relay to the wires 22 and 21, which includes battery D and alarm

or gate *d*. The latter immediately operates and it continues in operation as long as the circuit of C remains closed. When the forward wheels of the train have passed the break a^2 at the crossing, the battery E is shunted from the relay A, and it thus being de-energized releases its armature and would close the circuit of relays B′ and C were it not for the fact that the circuit of B′ is already broken between the back-stop and armature of relay B. Consequently the circuit of relay C will not remain closed after the last wheel of the train has passed the point a^2, because then battery F will energize relay A′ and break the circuit of relays C and B, which was first traced. In order, however, that the circuit of C cannot be closed while the train is between the points a^2 a^3, the armature of relay A when it strikes its back-stop closes a circuit-wire 9, battery G, wire 11, armature and frame of relay B, wire 19, coils of the relay B, wire 13, and complete to the armature. The circuit of B is therefore closed as long as the train shunts the battery E from the relay A, and consequently relay C will not be energized by the fact of the train being located between the points a^2 a^3. If the armature of the said relay B were against its back-stop, it will be observed that the circuit of C would be closed, as follows: wire 18, coils of relay B′, wire 14, back-stop of A′, wire 16, coils of C, wire 15, back-stop of A, armature of A, (which would necessarily be against its back-stop on account of the coils of A being shunted by the train,) wire 9, battery G, wire 11, armature of B, and complete to back-stop of B. In case a train had entered upon the right insulated section before or while a train was between the points a' a^3 then the alarm would continue to ring after the train had passed the point a^2, because A^2 would continue to be de-energized. The operation is exactly the same for trains approaching from the left, except that different relays are used—*i. e.*, train first de-energizes relay A, and that completes the circuit of relays B′ C through battery G—and as soon as the front wheels of the train pass the point a^2 relay A^2 will be de-energized and will close the circuit of B′ through battery H, which will then act as a guard to prevent the ringing of the alarm while the train is between the points a^2 a', as before described.

Having thus described my invention, I claim—

1. 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, and two other relays, as B B′, each controlling the other and the alarm-relay C, and two insulated sections of track in circuit, respectively, with the relays A A′.

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, and two other relays, as B B′, each controlling the other and the alarm-relay C, and two insulated sections of track in circuit, respectively, with the relays A A′, and batteries connected between the rails, whereby the wheels and axles of trains will operate an alarm or gate, in the manner described.

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

ROBERT J. M. DANLEY.

Witnesses:
ARTHUR S. FELCH,
JOHN RICHARDS.