(No Model.) 2 Sheets—Sheet 1.

O. H. CLARK.

ELECTRIC CIRCUIT FOR RAILROAD CROSSING GATES.

No. 307,096. Patented Oct. 28, 1884.

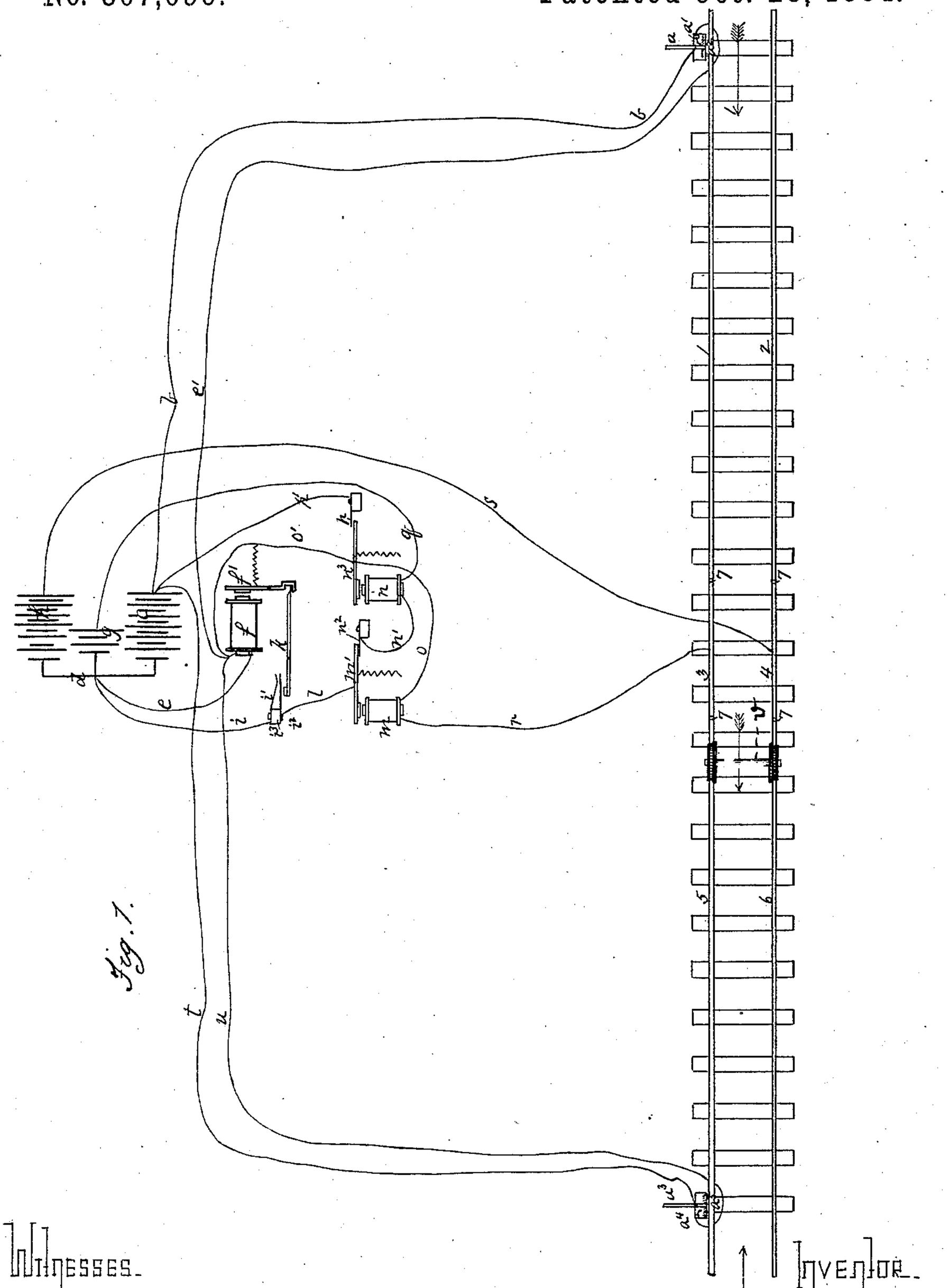

Fig. 1.

Witnesses.
W. B. Corwin
Jno K Smith

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Oliver H. Clark
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Bakewell & Kerr

(No Model.) 2 Sheets—Sheet 2.

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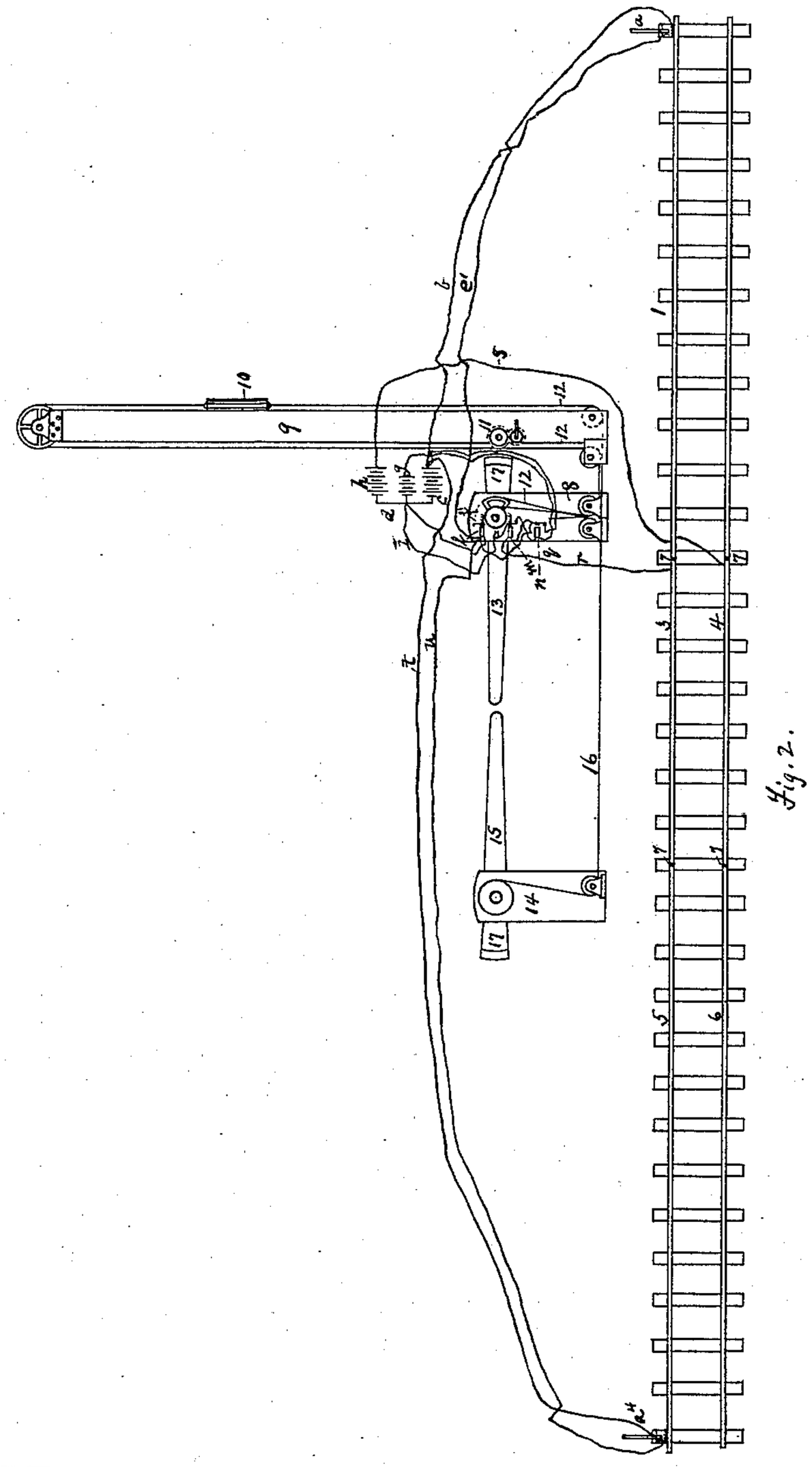

Fig. 2.

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UNITED STATES PATENT OFFICE.

OLIVER H. CLARK, OF PITTSBURG, PENNSYLVANIA.

ELECTRIC CIRCUIT FOR RAILROAD-CROSSING GATES.

SPECIFICATION forming part of Letters Patent No. 307,096, dated October 28, 1884.

Application filed September 11, 1883. (No model.)

To all whom it may concern:

Be it known that I, OLIVER H. CLARK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric Circuits for Railroad-Crossing Gates; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to electric circuits for operating the releasing and stopping mechanism of railroad-crossing gates on a single-track railroad, whereby the passage of the train makes and breaks the circuit, and causes the automatic operation of the gates.

To enable others skilled in the art to make and use my improvement, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a diagram of a single crossing and its circuits. Fig. 2 is a diagram of a crossing-gate and the circuits.

The railroad-track is divided into insulated sections 1 2 3 4 5 6, the sections 3 4 being insulated from the others by the interposition of a suitable insulating substance, 7, between the ends of the rails.

Extending vertically alongside of the rail 1 is a short lever, *a*, in such a position as to be struck by a projecting portion of the locomotive-engine or car. This lever is pivoted in a suitable frame, and at its lower end is provided with a spring, a^2, which tends always to maintain it in a vertical position. For convenience of illustration I have shown this lever as being horizontal; but when in use it stands vertical, as stated. At one side of the frame is a contact, a', which is insulated from the frame, and stands in such a position that when the lever is turned by the train passing in the direction of the arrow 1 its lower end will come in contact with the conductor a'.

Connected to the frame of the circuit-breaker *a* is a wire, *b*, which extends to one of the poles of the battery *c*. The other pole of the battery is connected by a conductor, *d*, and wire *e* to an electro-magnet, *f*, which is provided with an armature, f'. The other pole of the electro-magnet *f* is connected by the wire e' to the contact-piece a'. The armature f' operates the releasing or stop mechanism, which permits the barriers of the crossing-gate to assume a closed position. When the contact is made by the engine striking the lever *a*, the circuit to the electro-magnet *f* is closed, and the armature f' is drawn thereto and permits the closing of the gates. As soon as the lever *a* is released by the passing of the projection which strikes it, the circuit by the wires *b* e' is open. This would permit the crossing-gates to open before the train had passed. It is necessary to cause them to remain closed not only until the train reaches the crossing, but until the last car has passed. This is effected by the following devices: The lower end of the armature-lever f' is provided with a stirrup, in which one end of a pivoted lever, *k*, rests. The other end of *k* projects under a contact-spring, i^2, which in turn lies below, but not in contact with, a contact-spring, i', the said springs i' and i^2 being separated by an insulator, i^3. A wire, *i*, extends from the conductor *b* to the spring i', and a wire, *l*, extends from the spring i^2 to the armature m' of an electro-magnet, *m*. A wire, *o*, extends from the electro-magnet *m* to the armature n^3 of an electro-magnet, *n*, and also a wire, o', from n^3 to the electro-magnet *f*. The electro-magnet *n* is connected at one pole to the battery *g* by a wire, *q*, and to a contact, n^2, which lies under the outer end of the armature m', so that when m' is retracted from its magnet *m* it will be in contact with n^2, and the circuit will be from *i* to *l* m' n^2 n', magnet *n*, wire *q*, to battery *g*, the other pole of said battery being connected to the wire *i*. The outer end of the armature n^3 lies under an insulated contact, *p*, which is connected by a wire, p', to one pole of the battery *c*. When the armature n^3 is attracted to the magnet *n*, its outer end will be in contact with *p*. The magnet *m* is also connected by a wire, *r*, with the insulated-rail section 3, and the rail 4 is connected to one pole of the battery *h* by a wire, *s*.

Thus constructed, the operation is as follows: The closing of the circuit by the operation of the circuit-closer *a* and its retraction causes the vibration of the armature f', which, as stated, releases the pivoted lever *k*. The fall of the lever *k* brings the springs i' i^2 into contact, and closes the circuit from the battery *g*, through *i*, i', i^2, *l*, m', n^2, n', *n*, and *q*, to the other pole of battery *g*. This causes the magnet *n* to attract the armature n^3 and bring its outer

end in contact with p. This closes the circuit from battery c, wire p', contact p, armature n^3, wire o', magnet f, wire e, and conductor d to the other pole of the battery c, causing the magnet f to hold its armature f', and to retain the gates in their closed position. The battery g is small, and its only purpose is to supply a current through magnet n to operate the circuit-closer n^3.

When the train passes from the rails 1 2 onto the rails 3 4, a new circuit is established, which is as follows: beginning with battery h by wire s to rail 4, axle v, rail 3, wire r, magnet m, wire o, wire o', magnet f, wire e, and conductor d to the other pole of the battery h. This circuit being through the magnet f, tends to retain the armature in position, and prevents the opening of the gate so long as the train is passing over the section 3 4, which is of sufficient length always to have one of the car-trucks on it. The passage of the current through magnet m causes its armature m' to be attracted thereto, and breaks the contact between m' and n^2, and breaks the circuit through the magnet n, permitting the retraction of the armature n^3, and breaking the contact between n^3 and p.

In order to retain the armature n^3 in contact with the core of the magnet n until the circuit is fully established through magnet m, and so prevent any vibrations of the armature f', I construct the core of the magnet n of a metal which retains its magnetism for a sufficient period. When the train passes from the section 3 4 onto the section 5 6, the circuit through wires r and s is broken. The magnet m is provided with a core similar to the core of the magnet n, and retains its armature m' for a brief period after the circuit is broken by reason of its residual magnetism. During this period the armature f' is retracted, and operates the tripping mechanism, which permits the opening of the gate. The lever k being connected by suitable devices with the operating mechanism of the gate, is restored to its horizontal position by mechanical means, and its outer end is again supported by the stirrup on the lower end of the armature f'. By this time the armature m' has been retracted and again stands in contact with the spring n^2, and the lever k, having been restored to its horizontal position, no longer holds the springs i' i^2 in contact, so that all the circuits are open, and remain so until the passage of another train. The arrow 2 indicates the passage of a train in the opposite direction. At a suitable point is a second circuit-breaker similar to a. A train passing in the direction of arrow 1 would strike the lever a^3, as well as the lever a, but it would cause it to turn away from the contact a^1, so that no circuit would be established by the train after passing the crossing. A train passing in the direction of arrow 2 would repeat the operation just described, closing and opening the gates automatically by means of the same circuits, the wires t and u being connected in a similar manner as the wires b and c'. Prior to the entrance of a train upon section 3 4 a current is passing through the magnet f. When a train comes upon the section named, this current is broken and another substituted in its stead. The latter circuit includes the magnet m, which, as stated, immediately attracts its armature, but does not immediately release it. The immediate attraction of the armature is consequent upon the entrance of a train onto 3 4, breaking the first-established circuit through f. This constitutes the first function of the magnet m. Its second function is to hold its armature in contact with it for a moment after the train is off the section 3 4, and thereby prevent the completion of the first-established circuit through f, upon which the armature of the latter will be withdrawn and the gate opened.

In Fig. 2, I show a diagram of a crossing-gate consisting of a standard, 8, containing the magnets and armatures shown in Fig. 1, and the stop mechanism by which the movements of the operating mechanism are controlled, a weight-standard, 9, operating-weight 10, weight-raising drum 11, operating-chains 12, counterweighted oscillating barrier 13, opposite standard 14, and barrier 15, and chain 16, for actuating the barrier 15 from standard 8. The barriers have weighted ends 17, which cause them to stand normally in a vertical position. When the weight 10 is permitted to descend by the operation of the stop mechanism in the standard 8, it draws the barriers down to a horizontal position, as shown in Fig. 2. The opening of the circuit causes the stop mechanism to act and release the barriers, which are then free to rise.

In applications of even date herewith, Serial Nos. 106,147 and 106,150, I have shown and described gates provided with an electro-magnet corresponding to f f', and trip mechanism operated thereby to release the barriers, and I hereby make reference thereto for more specific description of such devices, which, as they form no part of the subject-matter of the present case, have been omitted herefrom.

A bell-magnet may be placed within the circuits including the circuit-closers a and a^3, and located at the crossing for the purpose of giving an alarm at the crossing when the gate is about to close. If wires c and i be considered as connected with the positive poles of the batteries, and wires t and b with the negative poles, the latter may be dispensed with by grounding the negative poles of the batteries h and c, and making ground-connections to the circuit-closers a a^3.

The advantage of my invention consists in my ability thereby to open and close automatically, by means of a passing train, the crossing-gates of a single-track railroad.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a circuit-closer capable of being operated by an advancing train to close an electric circuit, a battery connected to the said circuit-closer, an electro-magnet

placed in the said circuit having an armature for actuating the releasing mechanism of a railroad-crossing gate, a circuit-closer operated by such magnet, a secondary circuit, an electro-magnet and battery arranged in said circuit, and a circuit completed through the electro-magnet of the first circuit by the armature of the second electro-magnet, substantially as and for the purposes described.

2. The combination of a battery, a circuit-closer capable of being operated by an advancing train to close the circuit to said battery, an electro-magnet arranged in said circuit for operating the trip mechanism of a railway-crossing gate, a circuit-closer operated by such magnet, a secondary circuit operating a circuit-closer, and a third circuit connected directly to the battery and to the electro-magnet, said circuit being closed by means of the secondary circuit, whereby when the first circuit is opened the magnet will continue to be actuated by the third circuit, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 9th day of July, A. D. 1883.

OLIVER H. CLARK.

Witnesses:
W. B. CORWIN,
J. K. SMITH.