(No Model.)

C. A. SCOTT.

ELECTRIC RAILWAY SIGNALING APPARATUS.

No. 266,904. Patented Oct. 31, 1882.

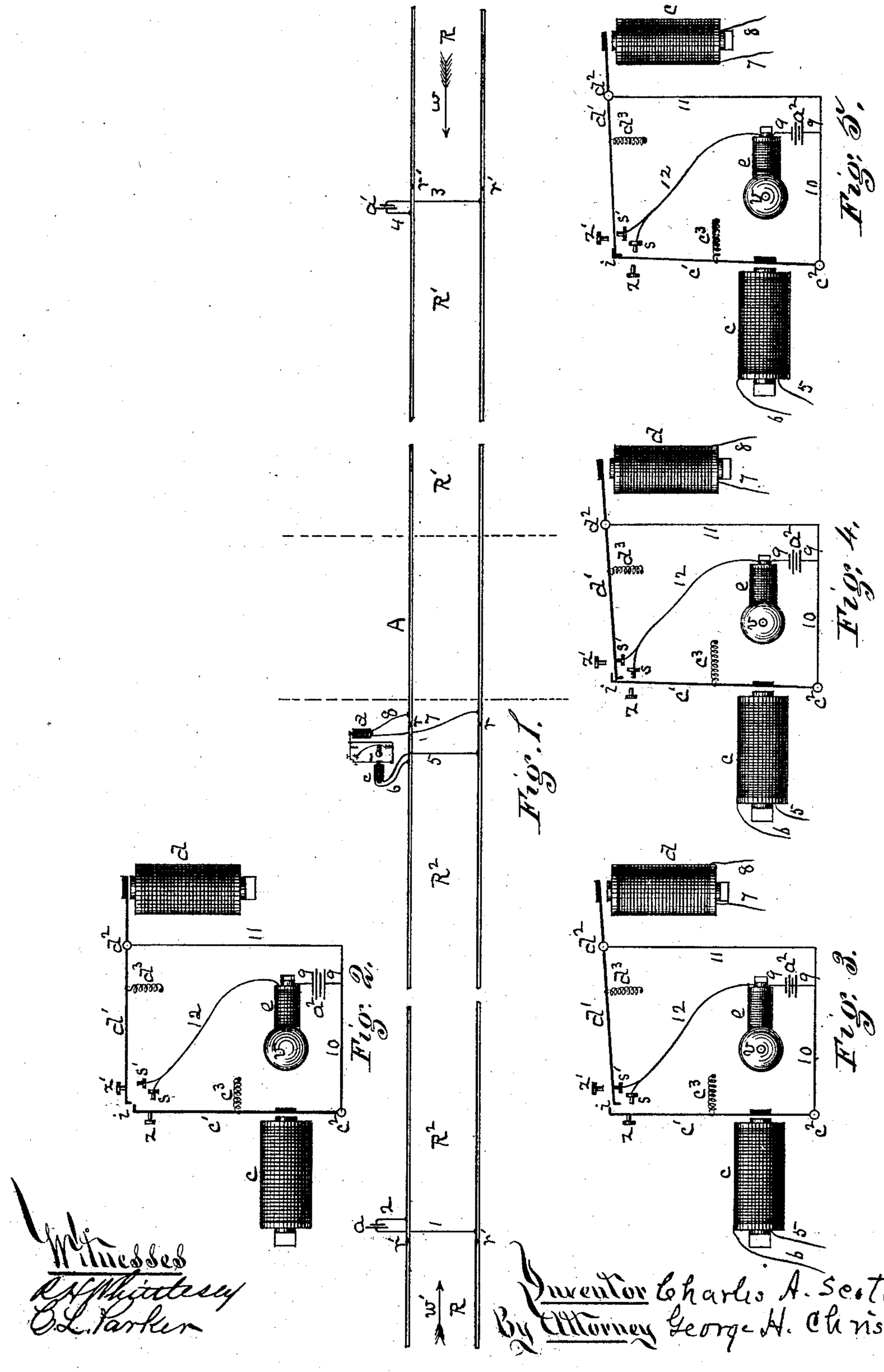

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Witnesses
R. F. Whitesey
E. L. Parker

Inventor Charles A. Scott
By Attorney George H. Christy

UNITED STATES PATENT OFFICE.

CHARLES A. SCOTT, OF BOSTON, MASSACHUSETTS.

ELECTRIC RAILWAY SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 266,904, dated October 31, 1882.

Application filed November 23, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. SCOTT, of Boston, county of Suffolk, State of Massachusetts, have invented or discovered a new and useful Improvement in Electric Railway Signaling Apparatus; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a diagrammatic view of a railway-track illustrative of the manner of utilizing my present invention; and Figs. 2 to 5 are views to an enlarged scale of the electrical appliances, and showing the same in the different positions or relations which they sustain to each other at different and successive steps of their operation.

My present invention relates more particularly to an electrical apparatus for ringing a bell or giving other alarm at any desired point on a line of railway—as, for example, at a highway or street crossing. While some or all the important features thereof may be advantageously used on one or both lines of a double-track road, it is chiefly designed for use on a single-track road; and for this purpose I have so organized it that, being actuated by the passing trains, it will cause an alarm to be sounded by a train coming from either direction, so long as the train is passing from any desired or predetermined distant point to or across the highway or street or other point to be protected, and also so that as soon as such point is passed, so that such protection is no longer desired, the bell or other alarm shall cease to sound. In order to work such an alarm on a single track by a train approaching from either direction, a make-and-break mechanism must be employed on each side of the crossing and at the proper distance. Now, to prevent an outgoing train or a train which has passed the crossing from ringing the bell by actuating the make-and-break mechanism arranged on that side of the crossing, and so continuing the alarm after all occasion for it has ceased, I so construct and organize the apparatus that as soon as the train shall have passed the crossing or other alarm-point the ringing apparatus will be locked out of operation, except by a following train, and such condition of the apparatus will continue to exist until such outgoing train shall have passed the distant make-and-break mechanism on the side of the crossing in which it is going. The apparatus is then automatically restored to its normal condition, and is then ready to be again actuated for alarm purposes by a train approaching from either direction. Hence I insure the giving of an alarm by a train approaching from either direction so long, and only so long, as an alarm is desired for protective purposes.

R R represent a portion of a single-track road on which is a street-crossing, A, or other point at which an audible alarm is desired. At or in convenient proximity thereto, as at *r*, I insulate the track-rails from each other, and on each side thereof I form by the usual electric connections between rails an insulated track-section, R′ R², such sections extending to points at which it is desired that an approaching train should begin to sound the crossing or other alarm, and at the ends of such sections I insert the usual insulating material, as at *r*′. At or near such termini I connect the opposite lines of rails by wires 1 2 3 4 with batteries *a a*′, as is usual in closed rail-circuits. At or in convenient proximity to the crossing A or other point to be protected I arrange three electro-magnets, *c*, *d*, and *e*. One, *c*, has its opposite poles connected by wires 5 and 6 with the opposite rails of the one section R². Another, *d*, is similarly connected by wires 7 and 8 with the section R′, and the third, *e*, which is the bell-ringing magnet, has a wire, 9, extending from one pole through battery *a*², and then branching by one wire, 10, to the pivoting-point *c*² of armature-lever *c*′, and by the other branch, 11, to the pivoting-point *d*² of armature-lever *d*′. A wire, 12, leads from the other pole of the bell-ringing magnet *e* by a branching line to each of two contact-points, *s s*′. The armature-levers *c*′ *d*′ are furnished with retractile springs *c*³ *d*³, and suitable stops, *z z*′, are to be added to limit the outward movement of the levers. The adjacent ends of the levers are made of a hook shape, as shown at *i*, and they are so disposed that the hooks may engage each other, as presently to be explained. The normal position of the apparatus, there

being no train or part of a train on the track between r' r', is as represented in Figs. 1 and 2. Each magnet c d is included in a closed circuit, so as to attract its armature; but the bell-ringing magnet e is not in any closed circuit. Assuming, now, that a train approaches from the right, or as indicated by the arrow w, as soon as its wheels and axle connect electrically the opposite rails of section R′ the circuit through such rails is "short-circuited," as it is called, so that the electro-magnet d is no longer under the influence of the battery a'. Hence the armature-lever d' is released, and by the spring d^3 its tail end is drawn down till contact is made with s', Fig. 3, and a closed circuit is then made from s' by wire 12, through magnet e, wire 9, through battery a^2, wire 11, and armature-lever d'. By means of any suitable bell-ringing apparatus and the bell v a continuous alarm is thus caused to be rung at the crossing so long as any part of the train remains on the section R′; but before the rear of the train leaves the section R′ the forward end of it passes onto the section R², which has the effect to short-circuit the circuit through the rails of that section, and relieve the electro-magnet c from the control of the battery a. Hence the armature-lever c' will be released under the power of the spring c^3, and will drop its tail end forward against the end of the lever d', and with its hook outside the end of d', but without reaching the contact s, the parts being suitably proportioned to this end, all as represented in Fig. 4. The apparatus will remain in this condition until the rear of the train passes entirely off the section R′, the bell sounding continuously up to this time; but as the train has then passed the point to be protected, no alarm is longer required. The last wheels and axle having thus passed the point r, the circuit is restored through the magnet d, so as to attract its armature d'; but the tail-piece of such armature, leaving the contact s', so as to break the bell-ringing circuit, which has been operative up to this time, still remains inside the hook of the armature-lever c', Fig. 5, so as to prevent such armature-lever from making contact at s, and from so making a new bell-ringing circuit while the train is passing over and off of the section R². As soon as the train entirely clears this section the circuit is restored through c, so that the armature-lever c' is attracted, as a result of which the hook ends of the armature-levers are disengaged, and the apparatus goes back to the normal position indicated in Fig. 2. If a train approaches from the left, as indicated by arrow w', exactly the same operations will take place, but in reverse order. As the train enters on section R² magnet c will be demagnetized, and its armature-lever c' will go to contact s, so as to make a closed bell-ringing circuit from s to 9, as before, and then by wire 10 and armature-lever c' back to s. The bell will continue to ring until the rear of the train shall have left the section R²; but in the meantime the forward end of the train has cut out the magnet d from the influence of its battery, so that the hook on d' is then outside the end of c'. When the tail of the train has passed r the electro-magnet c, being then in a closed circuit, causes its armature-lever to clear its contact s and break the bell-ringing circuit; but, its end being inside the hook of d', and the electro-magnet d being demagnetized, such engagement prevents the latter from making another bell-ringing circuit by contact of d' at s', and this condition continues until the train shall have passed off the section R′, after which the apparatus goes again to its normal condition, as before.

It will be observed that after a train has entirely passed the point r, so that the bell-ringing apparatus is locked as against the action of the departing train, it is not locked as against a train following. This will be seen by reference to Fig. 5. This represents the condition of the apparatus with a train off R′ and on R², and going in the direction of the arrow w. Suppose it be necessary or important that another train should immediately follow, or that an incoming train or a switching-engine should come up to or approach A from the same direction, the short-circuiting of the section R′ would, as before described, bring the tail end of lever d' back to its contact s', and restore or remake the bell-ringing circuit first described, so that the alarm would be sounded and continue to sound so long as any train or part of a train was on R′, whether the section R² were occupied or not.

So far as I am aware, it is wholly new with me to construct an electric alarm apparatus worked by a train coming from either direction until the alarm-point is passed, and no longer, (by that train,) and at the same time shall be in condition for the sounding of an alarm by a following train, and the same is true of trains going the other way, the devices operating in the other order, as above indicated.

Changes and modifications may be made, such as are commonly known under the heads of "mechanical equivalents," "colorable variations," "obvious substitute," &c., and the same are included herein. Also, by reversing the connections and circuit arrangements in such manner as will readily come within the capacity of a man skilled in this branch of the art, a normally-open track-circuit may be substituted for the closed circuits described, so as by a substantially like operation to perform the same functions, and such modification is hereby included herein.

I am aware of a prior invention by Oscar Gassett, in which two electro-magnets actuating two interlocking armature-levers are employed in such manner that with trains going one way one armature-lever will be caused to drop into contact with the other, and so close a bell-ringing circuit of which the two armature-levers form a part, and so that the second armature-lever will then lock the first, so as to

prevent the breaking of the bell-ringing circuit until the point to be protected has been passed, all three circuits being on the same side of the point to be protected, and said apparatus having the further feature of operation that with trains going in the other direction the second armature-lever first above referred to will by its action lock the other in a circuit-broken position, and so prevent the formation of a closed bell-ringing circuit.

Instead of rail-circuits short-circuited as described, wire circuits, or circuits partly rail and partly wire, with suitable make-and-break mechanism, may be employed with like results.

I claim herein as my invention—

1. The combination of two railway signaling-circuits, an alarm-circuit split or divided at both ends, and armature-levers locking or engaging each other, substantially as set forth.

2. Hook-ended armature-levers *c' d'*, in combination with contacts *s s'* on an electro-magnetic alarm-circuit, substantially as set forth.

3. The combination of a railway signaling-circuit and electro-magnet on one side of a point to be protected by an audible signal, a make-and-break mechanism arranged on the other side of said point, an alarm-circuit and electro-magnet and an alarm to be actuated thereby, and a stop actuated by the armature-lever of the track-circuit, by which to prevent the making of a new alarm-circuit by the make-and-break mechanism on the other side of the point to be protected, substantially as set forth.

4. The combination of an electric alarm, a railway track-circuit on each side thereof, and interlocking armature-levers, either of which is adapted to be worked by a train approaching on one circuit, and to be locked out of action by the same train going out on the other circuit, as against any electric action effected by such outgoing train, but free to be actuated from the former circuit, substantially as set forth.

In testimony whereof I have hereunto set my hand.

CHARLES A. SCOTT.

Witnesses:

JOS. P. LIVERMORE,

OSCAR GASSETT.