

No. 664,819.

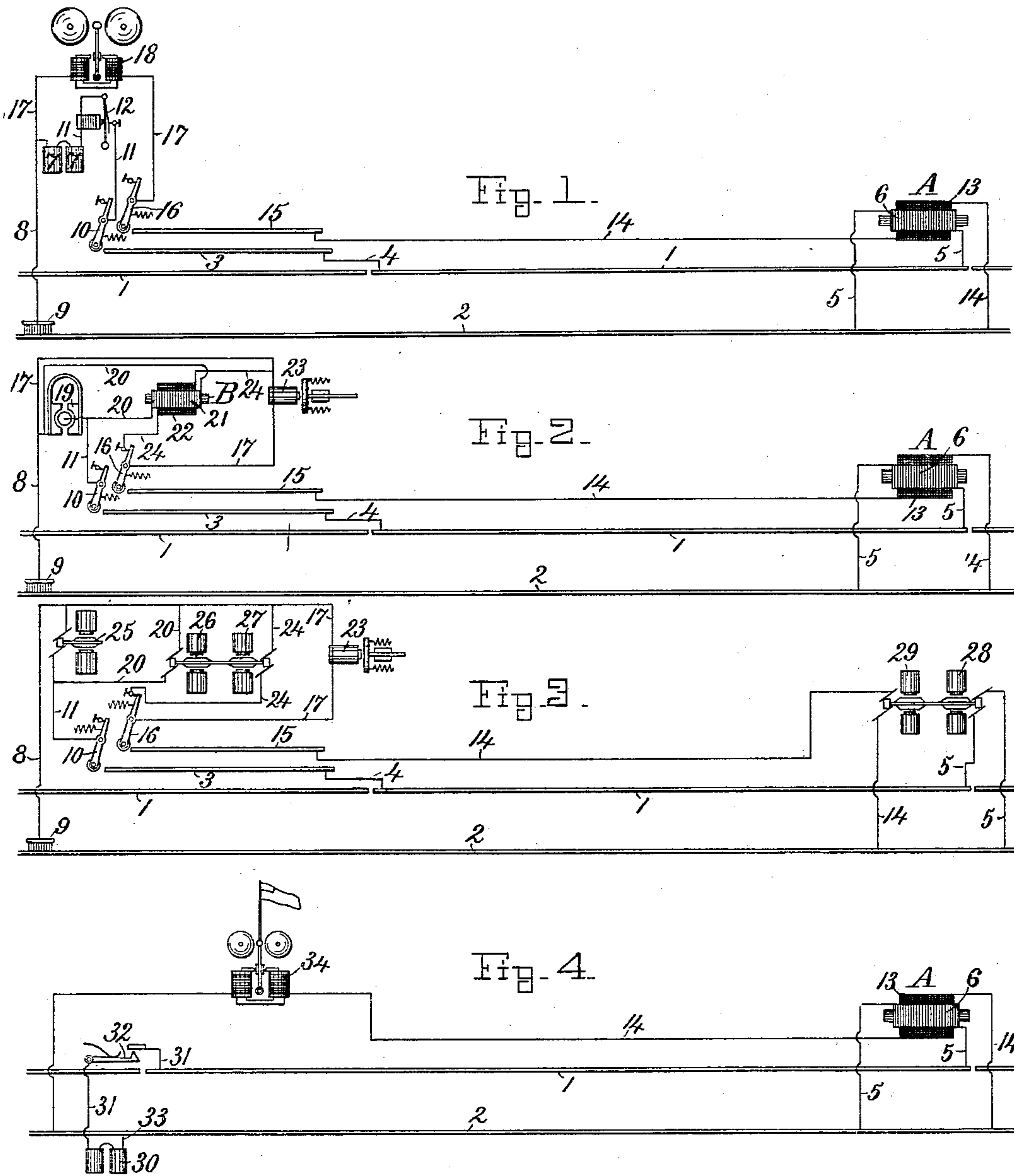
Patented Dec. 25, 1900.

E. L. ORCUTT.

ELECTRIC SAFETY APPLIANCE FOR RAILROADS.

(Application filed Jan. 3, 1898.)

(No Model.)



Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTRIC SAFETY APPLIANCE FOR RAILROADS.

SPECIFICATION forming part of Letters Patent No. 664,819, dated December 25, 1900.

Application filed January 3, 1898. Serial No. 665,309. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. ORCUTT, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electric Safety Appliances for Railroads, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in electric safety appliances for railroads, and more especially to safety appliances in which the track is divided into sections, which sections are charged with electricity either from a supply of electricity carried on the train, automatically charging the section as the train enters or is about to enter it, or from a separate supply of electricity arranged upon the road-bed or track, one for each section of the track.

The invention consists of means whereby the charging of the section of the track will cause the generating of a current of electricity in a parallel or line circuit, which current is generated at the opposite end of the section of the track to where the train is about to enter, provided, however, that the section of the track is unbroken, unobstructed, and safe for the passage of the train over said section.

It also consists of a signal either audible, visual, or mechanical and operated through the influence of the current of electricity in the line-circuit, thus indicating to the engineer the condition of the track in the section ahead.

Various devices may be employed to generate the current of electricity for the line-circuit, and various signals may be operated by the influence of this current to indicate the condition of the section of the track. These signals may be carried upon the train, arranged by the side of the track, or in any other conspicuous or convenient position.

The invention is carried out substantially as illustrated on the accompanying drawings, upon which has been shown diagrammatically some of the various arrangements and constructions of the invention, which drawings form an essential part of this specification, and whereon—

Figure 1 represents the invention as arranged to have the track-circuit of each section charged by a battery carried on the train, the charging of said circuit to generate a current of electricity in the line-circuit by means of a transformer situated at the opposite end of the section of the track to where the train is about to enter, and the current in the line-circuit to operate a polarized bell or gong carried on the train. Fig. 2 represents another arrangement of the train mechanism which may be used with the track mechanism the same as that shown in Fig. 1, which train mechanism consists of a magneto-electric machine to charge the track-circuit with electricity and to generate a current of electricity within a local closed circuit on the train by a transformer connected to said magneto-machine and contained within said local circuit, but which is cut out when the track mechanism is connected to the train mechanism, a magnet also contained within the local circuit energized or not by the condition of the local circuit, and a signal governed or controlled by said magnet. Fig. 3 represents the invention as arranged with a dynamo on the train to charge the section of the track or the track-circuit, a motor-dynamo or motor and dynamo situated at the opposite end of the section of the track to where the train is about to enter, the motor being operated by the current within the track-circuit and generating a current of electricity for the line-circuit connected thereto by means of the dynamo, a closed local circuit on the train, a motor-dynamo or motor and dynamo contained within said local circuit operated to generate a circuit within the local circuit by connections with the dynamo on the train, said motor-dynamo on the train being cut out by the connection of the train mechanism with the track mechanism, and a valve operated by a magnet contained within the local circuit. Fig. 4 represents a supply of electricity arranged upon the track or road-bed to charge the track-circuit, a circuit-closer operated by the train to close the track-circuit, a means to generate the current of electricity for the line-circuit, similar to that

shown in Fig. 1, and a signal arranged elsewhere than on the train and operated by the line-circuit.

Similar characters of reference refer to similar parts wherever they occur on the different parts of the drawings.

The track of the railroad is divided into sections of any desired length, and this is preferably accomplished by dividing the rail 1 into sections and insulating such sections from the others, the rail 2 being preferably made continuous.

Referring to the arrangement of the invention as illustrated in Fig. 1, the track is provided at one end of each section of the rail 1 with a contact-plate 3, connected to said section by means of the conductor 4. The opposite end of each of the sections of the rail 1 is connected to the continuous rail by means of the conductor 5, the primary coil 6 of an induction-coil or any other well-known form of transformer A being contained within said conductor. A supply of electricity 7 is carried on the train, which supply has been shown as consisting of a battery, one pole of which is in constant electrical connection with the rail 2 by means of the conductor 8 and the wheels of the train or a suitable brush 9. The other pole of the battery is in electrical connection with a brush 10 by means of the conductor 11, having a suitable interrupter 12 included in said conductor. The brush 10 engages the contact-plate 3 of each section of the coil as the train is about to enter the section with which the contact-plate is in connection, and by so doing a current of electricity is sent from the battery 7 through the conductor 11, interrupter 12, brush 10, contact-plate 3, conductor 4, section of rail 1, conductor 5, primary coil 6 of the transformer, rail 2, brush 9, conductor 8, and back to the battery 7, provided, however, that the rails are unbroken, unobstructed, and safe for a train to travel on. This current of electricity within the track-circuit is automatically broken or closed by means of the interrupter 12, and the breaking and closing of the current within the primary coil of the transformer induces a current of electricity within the secondary coil 13 of the transformer. This secondary coil 13 is contained within a conductor 14, connecting the continuous rail 2 with a contact-plate 15, arranged at the side of or near the contact-plate 3. The rail 2, conductor 14, and contact-plate 15 constitute the parallel or line circuit on the track. A brush 16 is carried on the train, which brush engages the contact-plate 15, it being connected to the conductor 8 or the brush 9 by means of the conductor 17, having a polarized bell or other signal 18 included within the conductor 17. The current of electricity induced within the secondary coil of the transformer is an alternating current, and it will be seen that when the brush 16 engages the contact-plate 15, connecting the line-circuit on the track with the circuit on the train, and

a current of electricity has been induced within the secondary coil of the transformer the bell 18 will continue to ring so long as the brushes 10 and 16 are in engagement with their respective contact-plates 3 and 15, thus indicating that the track in the section is unobstructed and safe; but if the rails are obstructed or broken, the line-circuit broken, or any of the apparatus out of working order no signal will be sounded on the bell and the engineer will thereby know that something is wrong. If the brushes on the train make contact with the track-circuits and the armature of the interrupter moves, but the bell fails to ring, then the engineer will understand that the trouble is in the line-circuit or the track-circuit is shunted by an obstruction and it is dangerous to travel over.

In Fig. 2 another arrangement of my invention has been illustrated, and in such an arrangement the track mechanism is the same as illustrated in Fig. 1; but the train mechanism differs. The current of electricity to charge the track-circuit when the brush 10 engages the contact-plate 3 is supplied from a magneto-electric machine 19, and as such a machine supplies an alternating or interrupted current no interrupter is necessary to cause the induction of a current of electricity in the secondary coil 13 of the transformer A. The conductor 20 is connected at its ends to the two poles of the magneto-electric machine and forms a local circuit on the train, which circuit includes the primary coil 21 of the transformer B, carried on the train. It will be seen that the interrupted current of electricity within the conductor 20 and primary coil 21 will induce an alternating or interrupted current of electricity within the secondary coil 22 of the transformer B. The magnet 23 is included within the conductor 17 which connects the brush 16 with the conductor 8, and as a conductor 24, which includes the secondary coil 22 of the transformer, connects the back-stop of the brush 16 with the conductor 17 beyond the magnet 23 it will be seen that said magnet will be supplied with an alternating current of electricity when the brush 16 is in engagement with its back-stop and that any suitable signal may be attached or operated by the action of the armature of the magnet 23 caused by the current in the conductor 24. If the track-circuit and line-circuit on the track are in working condition, the track is unbroken and unobstructed, and the brushes on the train are in engagement with their respective contact-plates on the track, the secondary coil of the transformer B and the conductor 24 will be cut out of the circuit governing the magnet 23, and the line-circuit of the track mechanism will be included within the circuit governing said magnet. As the current supplied from the transformer A to the line-circuit under these conditions is the same kind of a current as is supplied to the magnet 23 from the transformer B, it will be seen

that no changes will be made in the signal controlled by said magnet; but if the track or line circuits are broken or said circuits shunted by an obstruction on the rails or otherwise then the current in the line-circuit will fail to reach the signal, and therefore will not operate the same, but will consequently notify the engineer of danger or obstruction on the track ahead.

10 In Fig. 3 another arrangement of the invention has been illustrated, which arrangement is substantially as follows: A dynamo 25 is carried on the train and charges the track-circuit when the brush 10 engages the
15 contact-plate 3. A motor 26 is included within a closed circuit on the train, which circuit is charged by the dynamo 25. A dynamo 27 is connected to and run by the motor 26, so as to generate a current of electricity for the
20 closed circuit, including the magnet 23, which controls the signal. As the dynamo 27 is in the conductor 24 joining the back-stop for the brush 16 and the conductor 17, it will be seen that the dynamo 27 is cut out of said
25 circuit when the brush 16 is in engagement with the contact-plate 15. The conductor 5 at the opposite end of the section of the track has a motor 28 included therein, which motor is set in motion by the current of elec-
30 tricity in the track-circuit, which current is supplied from the dynamo 25 when the brush 10 engages the contact-plate 3. A dynamo 29 is included within the line-circuit, it being connected to and run by the motor 28. This
35 dynamo takes the place of the dynamo 27 and generates a current of electricity for the line-circuit when the dynamo 27 is cut out by the engagement of the brush 16 with the plate 15.

40 From the above description of Fig. 3 it will be seen that in the arrangement of my invention as there shown the current of electricity to operate the signal on the train when the track and train mechanisms are in engage-
45 ment with each other is generated at the opposite end of the section of the track to where said mechanisms engage each other and that this current of electricity is only generated when the track-circuit is properly charged.
50 Thus it will be seen that if the track is clear and safe and the line-circuit is in proper working order the signal on the train will remain as it was before the train and track mechanisms engaged each other; but if the
55 track-circuit or the line-circuit should be broken or shunted or the track be obstructed then the signal on the train would be changed and indicate that the section of the track ahead was unsafe.

60 It will be understood that the motor 26 and the dynamo 27 in the arrangement of my invention as shown in Fig. 4 might be dispensed with and the current of electricity for the circuit containing the magnet 23 to oper-
65 ate the signal on the train be supplied direct from the dynamo 25 and accomplish the same result, provided, however, that the conductor

24 be connected at one end to the back-stop for the brush 16 and at the other end be connected to the conductor 11 or the pole of the dynamo 25. It will also be understood that the motor and the dynamo driven by the motor might to equal advantage be combined in one machine in the form of a motor-dynamo, if so desired.

75 In Fig. 4 I have illustrated my invention as arranged when the track-circuit of each section of the track is charged from a separate source of electricity placed upon the road-bed, having said circuit normally broken or
80 incomplete and closed or completed by the action of the train upon a suitable circuit-closer. A transformer has been shown as being used in this arrangement in the same manner as that described in relation to Figs. 85 1 and 2. The signal contained within and operated by the line-circuit is placed at the side of the track or in some conspicuous place. Referring to said Fig. 4, the supply of electricity for the track-circuit consists of
90 the battery 30, placed in some convenient position upon the road-bed and connected with the section of the rail 1 by means of the conductor 31, including a suitable circuit-closer 32, the battery being also connected to the
95 continuous rail 2 by means of the conductor 33. The opposite end of the section of the rail is provided with the transformer A, connected to the rails of the section of the track in the same manner as described in relation
100 to Figs. 1 and 2. The signal 34 consists of any suitable device which can be operated by a polarized armature and is contained within the line-circuit and operated to indicate "safety" by the current of electricity in the
105 line-circuit, which current is generated in the secondary coil of the transformer A. The circuit-closer 32 is operated by the wheels of the train making and breaking the track-circuit, and it therefore performs the duty of an in-
110 terrupter as well as a circuit-closer.

115 It will be obvious to any one skilled in the art to which this invention appertains that although I have shown several arrangements of the invention upon the accompanying drawings still it is within the scope of mechanical skill to combine the devices there shown in many different combinations than those illus-
120 trated, and, in fact, any suitable mechanism may be used to supply a current of electricity to charge the track-circuit and any suitable mechanism may be used at the opposite end of the section of the track which may be caused to generate a current of electricity in a parallel or line circuit by the charging of the
125 track-circuit; also, that any suitable signal may be used and operated by the current of electricity in the parallel or line circuit without departing from my invention. It will further be understood that, if so desired, the parallel or line circuit may be charged, and there-
130 by cause the generating of a current of electricity to charge the track-circuit in order to operate a suitable signal.

Having thus fully described the nature, construction, and arrangement of my invention, I wish to secure by Letters Patent and claim—

1. In an electric safety appliance for rail-
5 roads, a track-circuit composed in part of the
rails of the track, and including a contact-
plate, a brush on the train, a supply of elec-
tricity on the train connected with said brush
to charge the track-circuit when said brush
10 engages said contact-plate, a parallel or line
circuit on the track including a second con-
tact-plate, a second brush on the train, a sig-
nal on the train connected with said second
brush, and a mechanism on the track included
15 within the track and line circuits at the op-
posite end of said circuits to where their re-
spective contact-plates are connected, oper-
ated by the current of electricity in the track-
circuit to generate a current of electricity in
20 the line-circuit and thereby operate the sig-
nal on the train, for the purpose set forth.

2. In an electric safety appliance for rail-
roads, a track-circuit composed in part of the
parallel lines of rails of the track, a supply of
25 electricity to charge the track-circuit, a par-
allel or line circuit composed in part of one of
the lines of the rails, a signal operated by a
current of electricity in the parallel circuit,
and a mechanism included within both cir-
30 cuits located at a position in said circuits
which is the greatest distance from said sup-
ply of electricity and signal and operated by

the current in the track-circuit to generate a
current of electricity in the parallel circuit to
operate said signal, for the purpose set forth. 35

3. In an electric safety appliance for rail-
roads, a track mechanism consisting of a
track-circuit, a parallel or line circuit, and a
mechanism included within both circuits op-
erated by a current of electricity in the track- 40
circuit to supply a current of electricity in
the parallel circuit, combined with a circuit
on the train a supply of electricity and means
to engage said track-circuit included in said
train-circuit, a second closed circuit on the 45
train, a signal and means to engage and loop
in said parallel or line circuit included in said
second train-circuit, and a mechanism oper-
ated by the supply of mechanism in the first
train-circuit to supply a current of electricity 50
in the second train-circuit to operate said sig-
nal but cut out and supplied by the current
in the parallel circuit on the track when the
train mechanism engages the track mechan-
ism, for the purpose set forth. 55

In testimony whereof I have signed my
name to this specification, in the presence of
two subscribing witnesses, on this 22d day of
January, A. D. 1897.

EDWARD L. ORCUTT.

Witnesses:

HENRY CHADBOURNE,
DANIEL CEDERBERG.