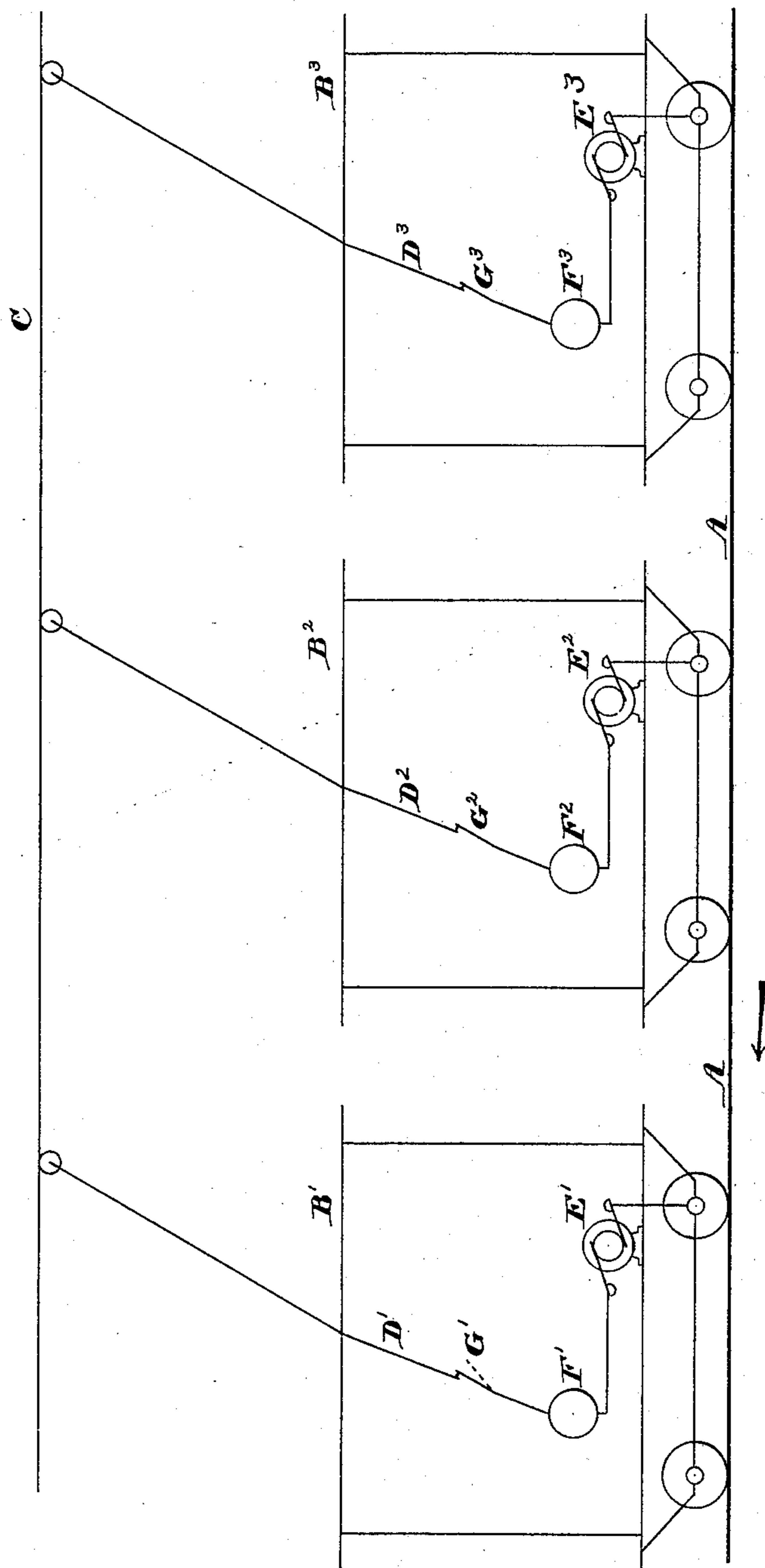


(No Model.)

A. L. WARE.  
SAFETY SYSTEM FOR RAILWAYS.

No. 539,840.

Patented May 28, 1895.



Witnesses:

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Theodore Fletcher

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# UNITED STATES PATENT OFFICE.

ALBERT L. WARE, OF CAMBRIDGE, MASSACHUSETTS.

## SAFETY SYSTEM FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 539,840, dated May 28, 1895.

Application filed October 15, 1894. Serial No. 525,902. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT L. WARE, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain  
5 new and useful Improvements in Safety Systems for Railways, of which the following, taken in connection with the accompanying drawing, is a specification.

My invention relates to safety systems for  
10 railways, is an improvement upon the invention described in Letters Patent No. 520,520, granted to William H. Elkins May 29, 1894; and it consists in certain novel features of construction, arrangement and combination  
15 of parts which will be readily understood by reference to the description of the accompanying drawing and to the claims hereto appended and in which my invention is clearly pointed out.

20 The object of my present invention is to remedy a defect in the safety system described in the before cited patent.

It will be seen upon careful examination that when the cross connections carried by  
25 the different trains or cars on the same line are "alternately of opposite sign" the generators in said cross connections must be of a fixed or definite polarity and that in order to be effective the trains must always bear the  
30 same relation to each other, *i. e.*, if the first train has the positive pole of its cross connection on the right the second train must have its positive pole on the left, the third on the right, the fourth on the left, and so on. Now  
35 it is evident that if train No. 2 is switched upon a side track and No. 3 is made to follow No. 1, the cross connections will not then be of "alternately opposite sign" and the safety devices will then become inoperative so far as  
40 No. 1 and No. 3 are concerned. To obviate this objection and render the safety appliances effective regardless of changes in the relative positions of the trains following each other I construct and arrange the safety ap-  
45 pliances as shown in the accompanying drawing, which is a diagram illustrating three trains, or cars following each other on the same track.

50 In the drawing A is one of the track rails which with its mate constitutes a conductor of low resistance and upon which the trains

or cars B', B<sup>2</sup>, and B<sup>3</sup> are arranged to be run in the direction indicated by the arrow.

C is a conductor of high resistance and may be a trolley wire as shown or it may be a third  
55 rail mounted upon the sleepers, or in any other suitable and convenient position.

D', D<sup>2</sup> and D<sup>3</sup> are the cross connections carried respectively by the trains or cars B', B<sup>2</sup> and B<sup>3</sup> and E', E<sup>2</sup> and E<sup>3</sup> are alternating dyna-  
60 mos placed within the cross connections D', D<sup>2</sup> and D<sup>3</sup> respectively.

F', F<sup>2</sup> and F<sup>3</sup> indicate translating devices also located respectively in said cross connections D', D<sup>2</sup> and D<sup>3</sup> so that each cross connec-  
65 tion has in it an alternating dynamo and a translating device or devices.

The translating device may be a bell, to give an audible signal, or it may be an index finger  
70 arranged to be vibrated about its axis of motion by the variations in the electric current and thus convey by sight an indication of danger or of safety, or the translating device may include both forms of signal substantially as  
75 shown and described in the before cited Letters Patent.

By the introduction into each cross connection of an alternating dynamo, said cross connections are rendered of no definite sign or  
80 fixed polarity, and the completed circuit, which is necessary for the success of the system will always be maintained and be operative under all conditions of train position, which cannot be accomplished when the cross  
85 connections are of "alternately opposite sign" and contain generators having a fixed polarity.

If two alternating dynamos of high power should be in a circuit having a small resistance they would undoubtedly come into syn-  
90 chronism and counteract each other; but alternators of comparatively small power in one circuit having large resistance will not come into synchronism, for the current of one will not be strong enough to bring the other under  
95 its influence and they would run independently of each other with the result of practically a continuous current, and a warning would be given to the engineer when two trains  
100 approached too near each other for safety whether the trains followed each other in the order shown in the drawing, or the order was

changed by the train B<sup>2</sup> being side tracked or passed around, and in front of the train B'. I also place circuit breakers G', G<sup>2</sup> and G<sup>3</sup> in the cross connections D', D<sup>2</sup> and D<sup>3</sup> respectively by means of which communication may be had between two trains which have been brought within the minimum distance for safety. If two trains are within this distance the bells connected with the translating devices will ring continuously, while the trains are within said minimum distance for safety, and the circuit remains unbroken. If the circuit is broken as indicated by dotted line at G' on train B', the bell ceases to ring, to ring again as soon as the circuit is closed.

If the circuit breaker is a common push button or key any number of pushes would be responded to by the same number of periods of silence caused by the bell ceasing to ring. These periods of silence can be counted as well as if they were periods of ringing, as would be the case if the button closed an open circuit when pushed.

By the adoption of some code of signals, in connection with this electric connection between trains, an easy means of signaling between trains which are within the minimum distance for safety is obtained. Each engineer may thereby learn the number and position of the train in communication and thus learn whether the danger is in front or at the rear.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a safety system for railways, the combination of two parallel main conductors one of which is of high resistance; a plurality of cross connections having no definite sign or fixed polarity, each carried by a car or a train, and two of them requisite to complete a circuit of which the main conductors form a part; an alternating dynamo as a current generator in each cross connection; and a translating device in each cross connection, all constructed and arranged to form circuits the resistance in which varies with the distance apart of the trains.

2. In safety systems for railways, the combination of two parallel main conductors one of which is of high resistance; a plurality of cross connections having no definite sign or fixed polarity, each carried by a car or a train and two of them requisite to complete a circuit of which the main conductors form a part; an alternating dynamo as a current generator in each cross connection; a translating device in each cross connection; and a circuit breaker in each cross connection all constructed arranged and operating substantially as and for the purposes described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 13th day of October, A. D. 1894.

ALBERT L. WARE.

Witnesses:

N. C. LOMBARD,  
WALTER E. LOMBARD.