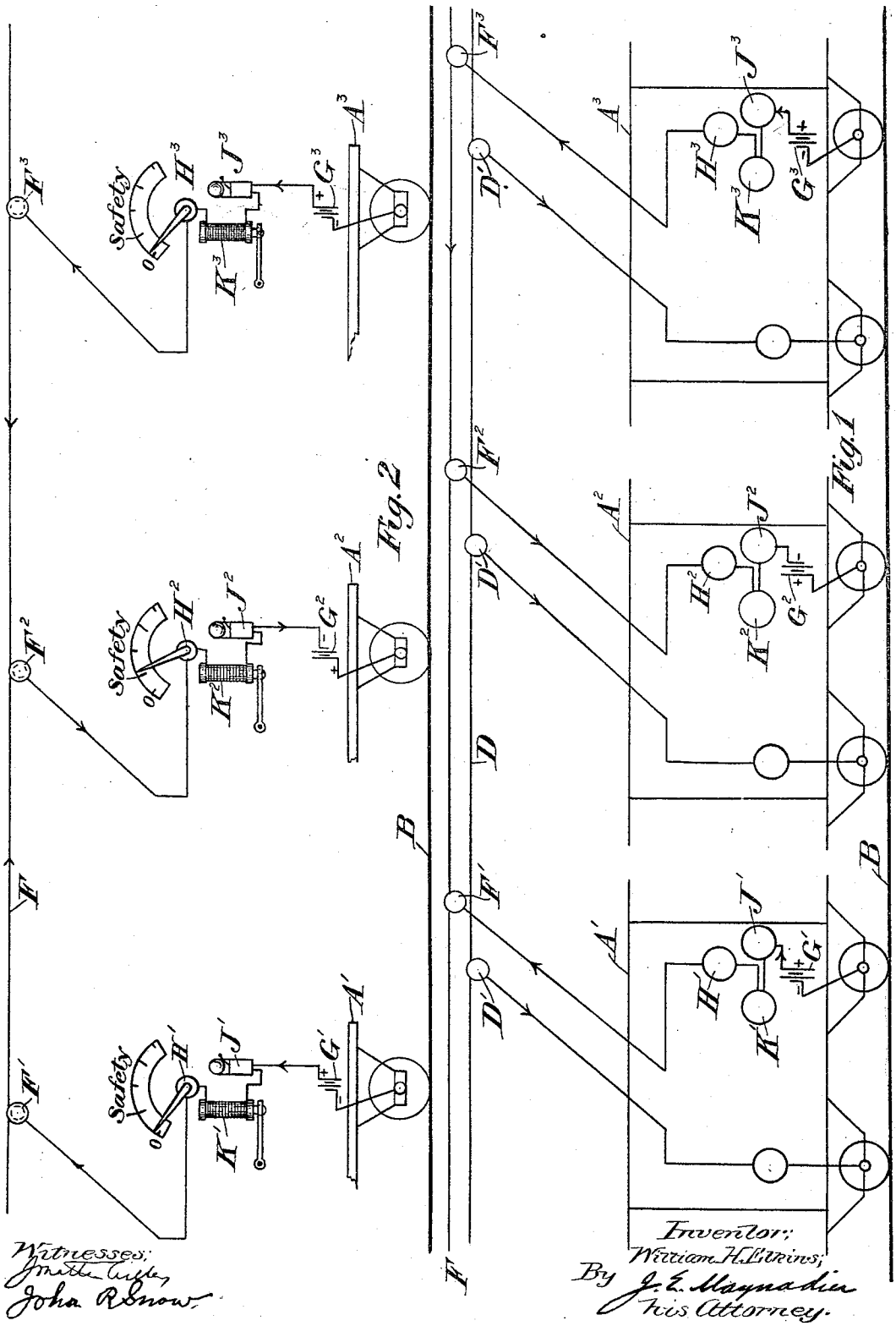
(No Model.)

W. H. ELKINS.

SAFETY SYSTEM FOR RAILROADS.

No. 520,520. Patented May 29, 1894.



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UNITED STATES PATENT OFFICE.

WILLIAM H. ELKINS, OF CAMBRIDGE, MASSACHUSETTS.

SAFETY SYSTEM FOR RAILROADS.

SPECIFICATION forming part of Letters Patent No. 520,520, dated May 29, 1894.

Application filed October 22, 1892. Serial No. 449,629. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY ELKINS, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Safety System for Railroads, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a diagram illustrating my system applied to an electric railway. Fig. 2 is a diagram illustrating the operation.

The main object of my invention is to cause the too close approach of one train to another to give warning to the engineer or conductor, or on a closer approach to stop the trains, and my invention consists in a circuit which is closed by the presence of two trains on the same track, and the resistance of which varies largely as the trains are closer together or farther apart; this circuit containing translating devices, adjusted to translate a given current into a signal, which may give warning, or which may itself stop the train, or may do both.

In Fig. 1, I have illustrated my system as applied to an electric railway, A′ A^2 A^3 indicating three trains of cars on track B; and D the usual trolley wire and D′ the usual trolleys for supplying motive power, all as usual. The wire F is of high resistance and connects the trains A′ A^2 A^3, by the extra trolleys F′ F^2 F^3, so that any two trains on the same track are in one circuit, whose resistance depends mainly upon the length of the resistance wire F, between the two trolleys. For example: the train A′, in Fig. 1, is in circuit with train A^2, through that part of resistance wire F which is between trolleys F′ and F^2 the rest of the circuit being through the translating devices, the batteries G′ G^2, and the track between the trains A′ and A^2, the track forming a ground. If the resistance of that part of wire F between trains A′ and A^2 be say one hundred ohms, when the trains are at the minimum distance for safety, and the electromotive force of the batteries G′ and G^2 be each twenty-five volts, the current in the circuit of which the trains A′ A^2 form part, will be less than one-half an ampère; and the indicators H′ H^2 are so adjusted that the index will be between zero and safety; and the bells J′ J^2 will not be sounded, they being adjusted to require say a current of at least one ampère. But when the trains A′ and A^2 get nearer together, say only half as far apart as when the resistance of the wire F between them is one hundred ohms, and that resistance therefore falls to fifty ohms, the current will then be nearly an ampère, and the indicator index will have moved past safety. A closer approach of the trains A′ A^2 (whether going in the same direction or in opposite directions) will diminish the resistance of that part of wire F between them, until the current exceeds one ampère, when the bells J′ J^2 will sound; giving a second warning; for the position of the index of the indicators is in itself a visible warning. Should neither warning be regarded, and the trains get still closer together, the current in the safety circuit will grow still stronger, until it becomes of sufficient strength to cause magnet K′ to attract its armature, which by means now too well known to require description may either apply the brakes or shut off power or do both. It will be obvious that the translating devices H, J, and K may be widely varied in construction and that my invention may be embodied whether translating devices of one construction or another be used.

My invention is also applicable to other railways, as will be plain from Fig. 1, if the trolley wire D and the trolleys D′ be omitted from that figure. Of course the track of other railways is not so good a ground as is the track of electric railways with the trolley system; but any electrician of ordinary skill can easily determine the resistance of a given length of track, and govern himself accordingly.

It will be obvious that the trains A′ A^2 A^3 may be connected electrically with the resistance wire F in any suitable way; but I show a trolley connection as that is the best form known to me.

Fig. 2 is a diagram of the safety circuits, which illustrates that if there be three trains, each at the minimum distance for safety from the others, the current through the translating devices of the middle train will be strong enough to indicate danger; for with one-half an ampère through the translating devices on train A′, and with one-half an ampère through

the translating devices on train A^3, there will be one ampère through the translating devices of train A^2, as will be clear from Fig. 2; because all the current flowing in circuit A′ to A^2, and also all the current flowing in circuit A^3 to A^2 must pass through the cross connection and the instruments carried by A^2, that is the warnings will be given on the middle train, A^2, before they are given on the other trains A′ and A^3; but will be given on the trains A′ and A^3 as soon as either gets too close to the middle train A^2. And so if there be more than three trains on the same track, the first, second and third corresponding as a group to the trains A′ A^2 A^3; the second, third and fourth, making a like group; the third, fourth, and fifth a like group and so on. That is to say the polarity of the current on the first, third, fifth, &c., trains alternates with the polarity of the current on the second, fourth, sixth, &c., trains; as will be clear from the signs of polarity on the drawings.

While I have described the preferred form of my invention it will yet be plain that the main feature of my invention is my new safety circuit composed of two main conductors, the high resistance wire F and the track B, and two cross connections between the two main conductors, and which complete the safety circuit; the resistance of which depends, therefore, upon the distance apart of the two cross connections.

Another example of my invention is a circuit composed of two main conductors the high resistance wire F and track B and a vehicle which connects the two main conductors. This form of safety circuit will be more clearly understood if the train A′ be supposed to be at a stand still and to represent nothing more than a cross connection between the main conductors F and B; then as train A^2 travels toward A′ the current in the safety circuit will rapidly increase; but as it travels away from A′ the current will rapidly decrease; and in this way appropriate signals will be given, as will be clear without further description.

The gist of the whole matter is that one or both of the cross connections are moving connections and that one main conductor is of high resistance. Of course both main conductors may be of high resistance, and both should be, except where one, the track B, is used as a part of the motor circuit, when, of course, it must be of low resistance; and the proper resistance must be in main conductor F.

What I claim as my invention is—

1. The safety system for railway trains above described comprising two main conductors disconnected electrically and one insulated and of high resistance; a plurality of cross conductors each carried by a train, and alternately of opposite sign and two of them requisite to complete a circuit of which the main conductors form part; a plurality of generators each carried by a train; and a plurality of translating devices each carried by a train; all organized to form circuits whose length and resistance vary with the distance apart of the trains, substantially as set forth.

2. The safety system for railway trains above described comprising two main conductors disconnected electrically and one insulated and of high resistance; a plurality of cross conductors each carried by a train and alternately of opposite sign and two of them requisite to complete a circuit of which the main conductors form part; a plurality of generators each carried by a train; and a plurality of sets of alarm devices those of each set responding to different strengths of current, and each set carried by a train; all organized to form circuits whose length and resistance vary with the distance apart of the trains, substantially as set forth.

WILLIAM H. ELKINS.

Witnesses:
EDWARD S. BEACH,
JOHN R. SNOW.