(No Model.)

F. E. KINSMAN.

SAFETY AUTOMATIC BRAKE.

No. 345,700. Patented July 20, 1886.

Fig. 1.

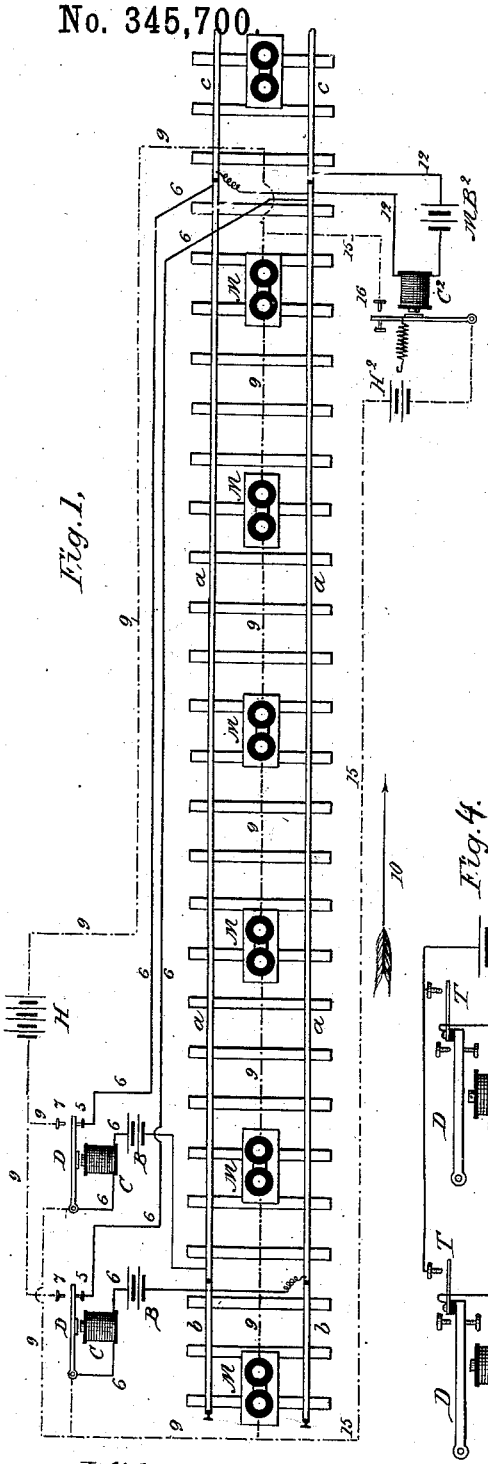


Fig. 3.

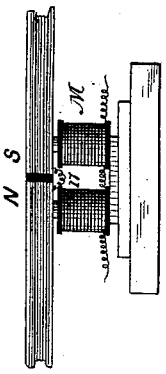


Fig. 4.

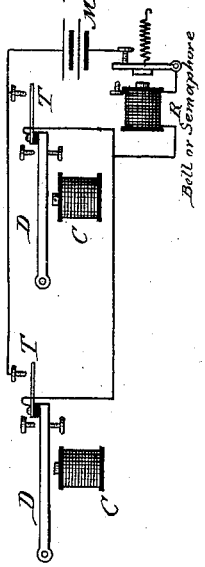
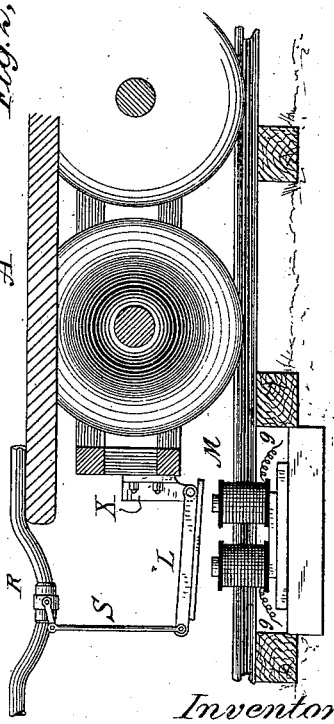


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SAFETY AUTOMATIC BRAKE.

SPECIFICATION forming part of Letters Patent No. 345,700, dated July 20, 1886.

Application filed January 20, 1883. Serial No. 82,505. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. KINSMAN, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Safety Automatic Brakes for Railway-Trains, of which the following is a specification.

The object of my invention is to prevent accidents to railway-trains arising from destruction of the permanent way, removal of rails, displacement of switches, or collisions between trains.

My invention consists in the combination, with a railway-car brake, of suitable means for automatically setting or applying the same, and a controlling electro-magnet, combined with a normally-closed safety-circuit which embraces the rails of the track, so that in the event of the breaking of said circuit, either designedly or accidentally, the brakes will be automatically applied.

My invention also consists in the combination of a series of insulated railway-track sections, electric circuits through the same, an automatic brake, combined with an electro magnet or magnets for automatically setting or applying the brake, and suitable circuits, whereby the connection of the rails of a track-section by the presence of a train upon it will operate the electro-magnet upon the train in a neighboring section, so as to cause the brakes to be automatically applied.

My invention consists, also, in the combination, with a railway-brake, of a stationary electro magnet or magnets, an armature for said magnet, placed on the locomotive or car and controlling the action of said brake, and suitable electric circuits controlling said electro-magnet, and arranged in the manner herein described, so that the brake will be thrown into action by the removal or breakage of a rail, the opening of a switch or draw-bridge, or by the presence of a train on an adjoining section of track.

My invention further consists of certain combinations of apparatus, that will be specifically defined in the claims following the description.

In the accompanying drawings, Figure 1 is a diagram illustrating the application of my invention to a section of railway-track. Fig. 2 is a side view of one form of apparatus that may be used upon the locomotive of the moving train. Fig. 3 illustrates the manner in which a portion of the rails may be made to act as the poles of the stationary electro-magnet.

For causing the operation of the brake through the agency of the electro-magnet, many plans may be adopted and will readily suggest themselves to skilled mechanics. When the brake is a steam or air brake, its cock is operated through action of devices controlled by said electro-magnet. This is the preferred way of carrying out the invention, and is the one described in this specification.

In Fig. 1, *a a* indicate the two rails of a section of railroad-track, which section may be of any length found desirable in practice—say one mile. The rails of adjoining sections on either side are indicated at *c c* and *b b*, respectively.

B B indicate galvanic batteries or other suitable generators of electricity, connected to the rails *a a* at or near one end of the section, and each having the same pole to a rail, so as, by the mutual opposition of batteries having like poles opposed to one another, to diminish the tendency of each battery to form a shunt-circuit through the opposite rail and the other battery. At the remote ends of the section each rail is connected to a return-conductor, 6, carried by posts or underground to the opposite pole of a battery, and including at any desired point a relay electro-magnet, C. The circuit 6 passes, as indicated, through the armature-lever D of the electro-magnet C and the front contact-stop, 5, therefor, so that when the circuit is broken at any point the reclosing of the circuit will not restore the armature to its original position, owing to the rupture at 5. The armature will therefore remain against its back contact, closing the relay-circuit, to be presently described, in which is the controlling electro magnet or magnets for the brake, until restored by some other means, and any break of the main circuit, of however little duration, will be effectual in bringing the controlling-magnets of the brake into operation and causing them to remain in operation.

H indicates a second battery or generator, in the circuit of which (indicated by the numeral 9) are one or more electro-magnets,

which serve to bring the brakes of a railroad-train into operation. These electro-magnets are in the present case placed at intervals along the road-bed, either between or beside the tracks, and sufficiently close to one another to give a practically continued pull upon an armature carried by the train in close proximity to the poles of the magnets when the train is moving at a normal speed.

The electro-magnets are indicated at M in top view, and are distributed throughout the section, one or more, however, being placed at the end of a preceding section, *b b*, so that in case of derangement in section *a a* at a point near *b* the train may be brought to a stop before reaching the break in the track. This arrangement is for a double-track road on which trains are moving in the direction of the arrow 10. For a single-track road, the series of electro-magnets M should obviously overlap into section *c c* in the same manner. The circuit 9 9 is completed by the contact of either armature with its back-stop 7, in obvious manner, the armature-lever and stop forming a portion of the circuit.

In Fig. 2, L indicates the armature of electro-magnets M. Said armature is mounted in any suitable manner upon the locomotive or other portion of the train. It is here shown as pivoted on a frame, X, on the locomotive.

R indicates the controlling cock, valve, or other device in a pipe of a steam or air brake apparatus, and connected by a rod, S, or other suitable means, directly or indirectly with the armature L. Said cock is constructed in proper manner so that friction or other means will cause it to retain any position into which it is put.

The operation is as follows: So long as armature L remains unattracted by an electro-magnet, M, the air or steam brake is off. If either rail-circuit be ruptured, the current of battery H through the electro-magnets M is closed, so that the armature L of any train for the time being on the section or subsequently approaching the same will be attracted, thus immediately putting on the brake and bringing the train to a stop.

In order to provide for applying the brakes automatically to a train which passes upon a section of track before a train in advance has left the section in advance, I propose to control the circuit of electro-magnets M by a second relay, C^2, as shown, or by any other suitable arrangement of circuits, such as are employed in railroad-signaling for operating a signal from a section in advance. Relay C^2 is connected by wires 12 12 with section *c c* of the track through a battery, M B^2, so that the wheels and axles of any train on section *c c* will close the circuit of said relay, thus closing through front contact, 16, the circuit 15, including a battery, H^2, and electro-magnets M. So long, therefore, as a train is on section *c c* the electro-magnets M will be energized, and any following train approaching or coming onto section *a a* will be brought to a stop.

Fig. 3 shows how the rail itself may be made to act on the armature, which for that purpose should be suitably mounted to move in close proximity thereto.

N S indicate the abutting ends of two rails, separated by some non-magnetic material, and magnetically insulated from one another by any suitable means, as indicated, one rail being in magnetic connection with the north and the other with the south pole of the electro-magnet M. Electric connection between the two rails may be made by a wire, 17, of copper; or the non-magnetic material magnetically insulating the rails may be of a conducting material, such as copper. If desired, the abutting ends of all the rails may be used in this manner, care being taken to so apply the electro-magnets that the opposite ends of the same rail shall be of opposite polarity.

In order to give visual or audible notice of the existence of danger to the engineer of an approaching train, or to the station attendant beside the track, so that the latter may warn the engineer of the train by signal, I may employ an arrangement of circuits such as is shown in Fig. 4, or any other suitable arrangement whereby a visual or audible signal shall be given on the occurrence of danger conditions that would result in putting on the brakes.

For the sake of simplicity, I prefer to work the visual or audible signal circuit from the relays C C, although they may be worked in the well-known way from the relays placed in other portions of the electrical system shown in Fig. 1.

In Fig. 4, R indicates an electro-magnet provided with an automatically-vibrating armature, operating, after the manner of an ordinary vibrator-bell, by breaking the circuit of the charging-battery M B^1 and the electro-magnet. The armature may work a bell-hammer or a signal disk or flag. The battery M B^4 is a local battery, and its circuit through R is closed, whenever the armature D of either relay C is retracted, by means of the auxiliary insulated contact spring and stop at T, in obvious fashion. The other circuits are omitted from Fig. 4 for the sake of simplicity.

Many modifications of the invention will readily suggest themselves in the details.

My invention is not limited to any particular construction of the devices, nor to any particular arrangement of the circuits. The rail or other circuit may control electro-magnets M directly, in obvious fashion, the relay being dispensed with, and said electro-magnet may be in any position, provided the circuits and connections be properly made to the same, so that it will be automatically energized by the rupture of the track-circuit. It is obvious, also, that said magnet, instead of acting directly through its armature upon the mechanism for putting on the brake, may act indirectly by setting or releasing devices which shall act on said mechanism.

What I claim as my invention is—

1. The combination, with the controlling devices for a railway-brake mechanism, of a governing electro-magnet for said devices, an armature for said magnet on the locomotive or train, and a normally-closed safety-circuit controlling the action of said magnet, and including the rails of a section of track.

2. The combination, with the controlling devices for a railway-brake mechanism, of a governing electro-magnet for said devices, a section of railroad-track, to the two rails of which the two poles of a battery are respectively connected, an electro-magnet in circuit with said battery, and circuit-connections for the governing electro-magnet of the brake, controlled by the electro-magnet connected to the rails, so as to cause the brake to be automatically applied when the two rails of the section of track are connected by a train upon such section.

3. The combination, with a steam or other brake, of a controlling electro-magnet, a battery and relay electro-magnet connected to the rails of the track, and a relayed or supplemental battery for energizing the controlling electro-magnet, the circuit for which battery is through the contact-points of the relay.

4. The combination, with a railway air or steam brake, of a governing-cock, operating devices for operating upon the cock so as to set the brakes, a governing-circuit, an electro-magnet on the road-bed, and an armature for the same, said magnet and armature controlling the action of the devices whereby the cock is operated, as and for the purpose described.

5. The combination, with the governing devices for a railway-car brake, of an armature mounted on the locomotive or other portion of the train and one or more stationary electro-magnets upon the road-bed, arranged to attract the moving armature.

6. The combination, with the governing devices for a railway-brake, of a controlling-armature and a rail which is polarized so as to act as an attracting-pole for the armature.

7. The combination, with an armature on a moving railway-train, of a stationary electro-magnet, the poles of which are connected to the abutting magnetically-separated ends of two rails.

8. The combination, with the controlling-cock for the air or steam brake of a railway-vehicle, of an operating-armature connected therewith, located upon a locomotive, and an electro-magnet on the road-bed for operating said armature so as to set the brakes.

Signed at New York, in the county of New York and State of New York, this 17th day of January, A. D. 1883.

FRANK E. KINSMAN.

Witnesses:
THOS. TOOMEY,
WM. H. BLAIN.