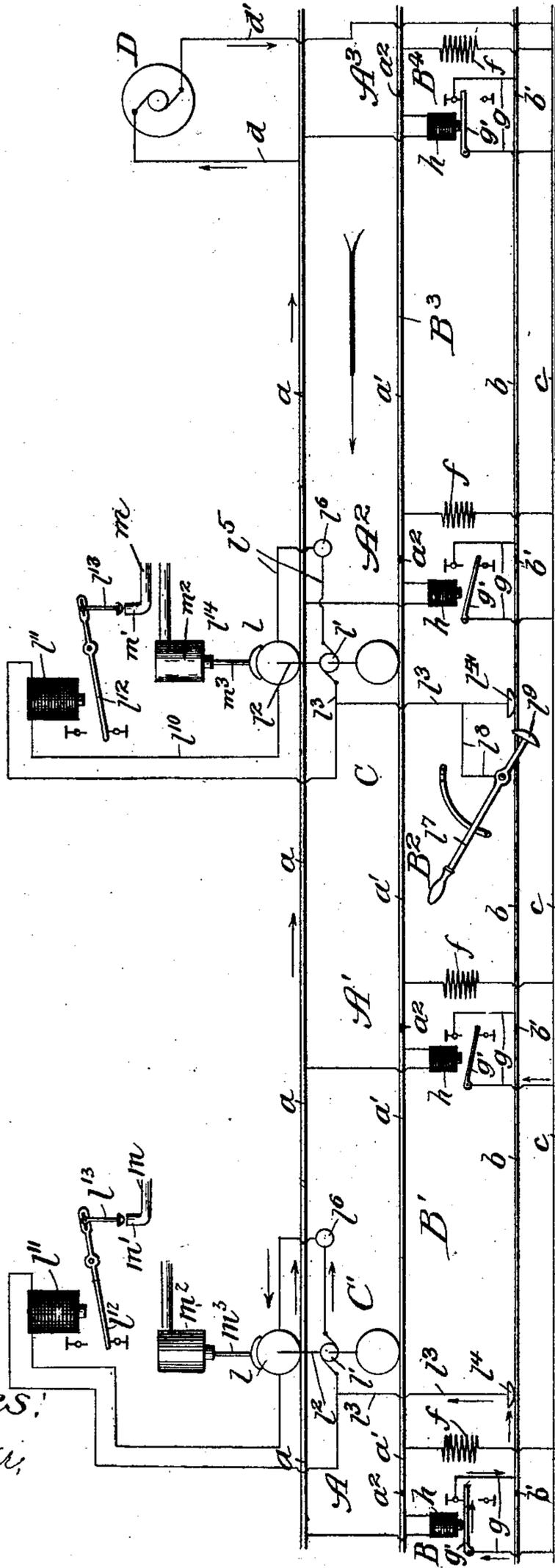


J. D. PRICE & A. C. MILLER.
TRAIN CONTROLLING APPARATUS.

(Application filed Dec. 9, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

JONATHAN D. PRICE AND ALEXANDER C. MILLER, OF AURORA, ILLINOIS.

TRAIN-CONTROLLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 705,291, dated July 22, 1902.

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To all whom it may concern:

Be it known that we, JONATHAN D. PRICE and ALEXANDER C. MILLER, citizens of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented a new and useful Improvement in Train-Controlling Apparatus, of which the following is a specification.

Our invention relates particularly to apparatus for use in connection with electric railways, such as elevated electric railways, for controlling the movement of cars or trains.

Our primary object is to provide apparatus adapted to the purpose of automatically stopping trains under certain conditions of the track.

Our invention is illustrated in its preferred embodiment in the accompanying drawing, which illustrates by a diagrammatic view a section of a railway-track, track equipment connected therewith, and train-carried mechanism adapted to cooperate with the non-transient portion of the apparatus.

The drawing illustrates a track having one electrically-continuous track-rail serving as an electric main and one track-rail electrically divided into sections corresponding to blocks, a third-rail trolley-wire or other suitable conductor electrically divided into sections corresponding to blocks, an electrically-continuous fourth rail or other suitable conductor serving as an electric main, conductors connecting said last-named sections with said last-named main and provided with switches, instruments controlling said switches and connected with the track-rails, and transient or train-carried mechanism equipped with a conductor normally in contact with said third rail, and a manually-operated conductor which may be thrown into contact with said fourth rail, if desired.

The preferred construction is as follows:

A¹ A² A³ represent block-junctions separating blocks B B' B² B³ B⁴, and C C' represent transient or train-carried mechanisms of two different trains, (only a portion of the mechanism C' being shown.)

The track comprises an electrically-continuous rail *a* and a rail having sections *a'*, electrically separated by insulations *a²*. The third rail comprises sections *b*, electrically separated by insulations *b'*. The fourth rail

is electrically continuous and is designated by the letter *c*. The rails *a* and *c* are charged from a generator D, connected with said rails by means of conductors *d d'*. The rail-sections *a'* are connected with the fourth rail *c* through resistance-coils *f*. The sections B of the third rail are connected at their advance ends through conductors *g*, provided with switches *g'*, with the fourth rail *c*. Each switch *g'* is controlled by an instrument *h*, connected with the rail *a* and with the rear end of the corresponding track-rail section *a'*.

The transient or train-carried mechanism C is conventionally shown and comprises, preferably, the drive-wheels *l* of a motor-car, an electric motor *l'* on a shaft or axle *l²*, a conductor *l³*, connected with the electric motor *l'* and equipped with a shoe or brush *l⁴*, engaging the third rail, a conductor *l⁵*, connected with the motor *l'* and having in its course a controller *l⁶*, said last-named conductor connecting with the wheel *l* of the motor-car on the track-rail *a*, a manually-operated lever *l⁷*, suitably mounted on the car or train and connected by a conductor *l⁸* with the conductor *l³* and provided with a shoe or brush *l⁹*, engaging the fourth rail *c*, a conductor *l¹⁰*, connected with the conductor *l³* and with the wheel *l* on the rail *a* and serving to energize a magnet *l¹¹*, and an armature *l¹²* for the magnet *l¹¹*, which controls a valve *l¹³* of the brake mechanism *l¹⁴*. The brake mechanism comprises a train-pipe *m*, having a vent *m¹*, a cylinder *m²*, and a wheel-engaging brake *m³*. The brake mechanism is one of the well-known constructions in which the brake is automatically applied by venting the air from the train-pipe.

The mechanism C' is a duplicate of the mechanism C.

It will be understood that the lever *l⁷* is ordinarily carried above the conductor *c* and usually swings in a vertical plane.

The operation is as follows: Current normally passes from the generator D to the main *c*, thence through the resistance-coils *f* to the rail-sections *a'*, thence through the instruments *h* to the track-rail *a* and back to the generator. Assuming a train to be in the block B' and the block B to be clear, the electric motor C' on the train will receive its current by way of the conductor *g* at the block-

junction A, the third-rail section *b* in the rear of the block-junction A being energized through said conductor *g*. Accordingly current will pass through the conductor l^3 to the train-motor, thence through the conductor l^5 and wheel *l* to the rail *a* and back to the generator D. At the same time the instrument l^{11} will receive current from the conductor l^3 , the other connection being through the wheel l on the rail *a*. Thus when the block in advance is clear the armature l^{12} is attracted and the valve l^{13} closed. Assuming one train to be in the block B' and another to be in the block B², the conditions illustrated in the drawing will be present. In this condition the current normally supplied to the instrument *h* at the block-junction A' is shunted through the axle of the motor-car of the apparatus C' to the rail *a*, thereby causing said instrument *h* to lose energy and drop its armature *g'*, thus deenergizing the rail-section *b* in the rear of the block-junction A'. Under such circumstances no current will be supplied to the apparatus C, the electric motor of said apparatus will fail to receive its current, and the instrument l^{11} will be deenergized, allowing the valve l^{13} to open, thereby to vent the train-pipe and apply the brake. Thus under such conditions the motor-car loses its current and the brakes are automatically applied. As shown, the block B³ is clear and the armature of the instrument at the block-junction A³ is closed.

The gist of our invention lies in the employment of a track having one electrically-continuous energized rail and one rail electrically divided into sections corresponding to blocks, a third rail electrically divided into sections corresponding to blocks, and a fourth rail which is electrically continuous and energized and which is connected through suitable switches with the sections of said third rail, instruments connected with both track-rails and automatically controlling said switches and connections between said fourth rail and the sections of the electrically-divided track-rail for supplying current to said switch-controlling instruments.

It is obvious that the invention may be used in connection with a third rail or trolley-wire, and it is likewise obvious that the fourth rail may be replaced by an insulated feeder or main, in which case the lever *l'* and its connections would be dispensed with. It will be understood, of course, that the lever *l'* is for the purpose of enabling the train to be advanced under control even while the block in advance is occupied.

Changes in details of construction within the spirit of our invention may be made. Hence no undue limitation is to be understood from the foregoing detailed description.

What we claim as new, and desire to secure by Letters Patent, is—

1. In apparatus of the character described, the combination of a track having one electrically-continuous rail serving as a main and

one rail electrically divided into sections corresponding to blocks, a third rail or conductor electrically divided into sections corresponding to blocks, a fourth rail or conductor which is electrically continuous and serves as a main, an electric generator connected with said first-named track-rail and said fourth rail, connections between said fourth rail and the sections of said third rail through which said sections are energized, instruments connected with both said track-rails and controlling said last-named connections, and connections for supplying current to said last-named instruments.

2. In apparatus of the character described, the combination of a track having one electrically-continuous rail and one rail having sections insulated from each other, a third rail or conductor having sections corresponding with said last-named sections, a fourth rail or conductor which is electrically continuous, a generator connected with said first-named rail and said last-named rail, conductors connecting said fourth rail with the several sections of said electrically-divided track-rail, conductors connecting said fourth rail with the several sections of said third rail and supplied with switches, and electromagnets controlling said switches and connected with both track-rails.

3. In apparatus of the character described, the combination of a track having one electrically-continuous rail and one rail having sections insulated from each other, a third rail or conductor having sections corresponding with said last-named sections, a fourth rail or conductor which is electrically continuous, a generator connected with said first-named rail and said last-named rail, conductors connecting said fourth rail with the several sections of said electrically-divided track-rail, and having in their courses suitable resistance-coils, conductors connecting said fourth rail with the several sections of said third rail and supplied with switches, and electromagnets controlling said switches and connected with both track-rails.

4. In apparatus of the character described, the combination of a track having one rail electrically divided into sections, a third rail electrically divided in corresponding sections, a fourth rail which is electrically continuous, resistance-coils connected with said fourth rail and with the sections of said electrically-divided track-rail, conductors connected with said fourth rail and with the advance ends of the sections of said third rail and supplied with switches, electromagnets controlling said switches and connected with said electrically-continuous track-rail and with the rear ends of the sections of said electrically-divided track-rail, and an electric generator connected with said electrically-continuous track-rail and with said fourth rail.

5. In apparatus of the character described, the combination of a track having an electrically-continuous rail, and a rail electrically

divided into sections, a third rail electrically divided into corresponding sections, a fourth rail or conductor connected with the several sections of said electrically-divided track-rail, switch-supplied connections between said fourth rail and the several sections of said third rail, electromagnets controlling said switches and connected with both track-rails, train-carried mechanism having a conductor engaging said electrically-continuous track-rail and a conductor engaging said third rail, and a generator serving to energize said electrically-continuous track-rail and said fourth rail.

6. In apparatus of the character described, the combination of a track having an electrically-continuous rail, and a rail electrically divided into sections, a third rail electrically divided into corresponding sections, a fourth rail or conductor connected with the several sections of said electrically-divided track-rail, switch-supplied connections between said fourth rail and the several sections of said third rail, electromagnets controlling said switches and connected with both track-rails, a generator connected with said electrically-continuous track-rail and said fourth rail, and a train-carried electric motor having a conductor engaging said electrically-continuous track-rail and a conductor engaging said third rail.

7. In apparatus of the character described, the combination of a track having an electrically-continuous rail, and a rail electrically divided into sections, a third rail electrically divided into corresponding sections, a fourth rail or conductor connected with the several sections of said electrically-divided track-rail, switch-supplied connections between said fourth rail and the several sections of said

third rail, last-named electromagnets controlling said switches and connected with both track-rails, a generator connected with said electrically-continuous rails, a train-carried electric motor, a train-carried brake mechanism, a magnet controlling said brake mechanism, conductors connecting said electric motor and said electromagnet with said electrically-continuous track-rail, and a conductor connecting said electromagnet and said electric motor with said third rail whereby said motor is deprived of current and the brakes applied simultaneously therewith when a deenergized third-rail section is encountered.

8. In apparatus of the character described, the combination of a track having an electrically-continuous rail, and a rail electrically divided into sections, a third rail electrically divided into corresponding sections, a fourth rail or conductor connected with the several sections of said electrically-divided track-rail, switch-supplied connections between said fourth rail and the several connections of said third rail, electromagnets controlling said switches and connected with both track-rails, a generator connected with said electrically-continuous rails, a train-carried electric motor having a conductor engaging said electric continuous track-rail and a conductor engaging said third rail, and a manually-controlled conductor connected with said electric motor and movable into contact with said fourth rail.

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ALEXANDER C. MILLER.

In presence of—

ALBERT D. BACCI,
M. S. MACKENZIE.