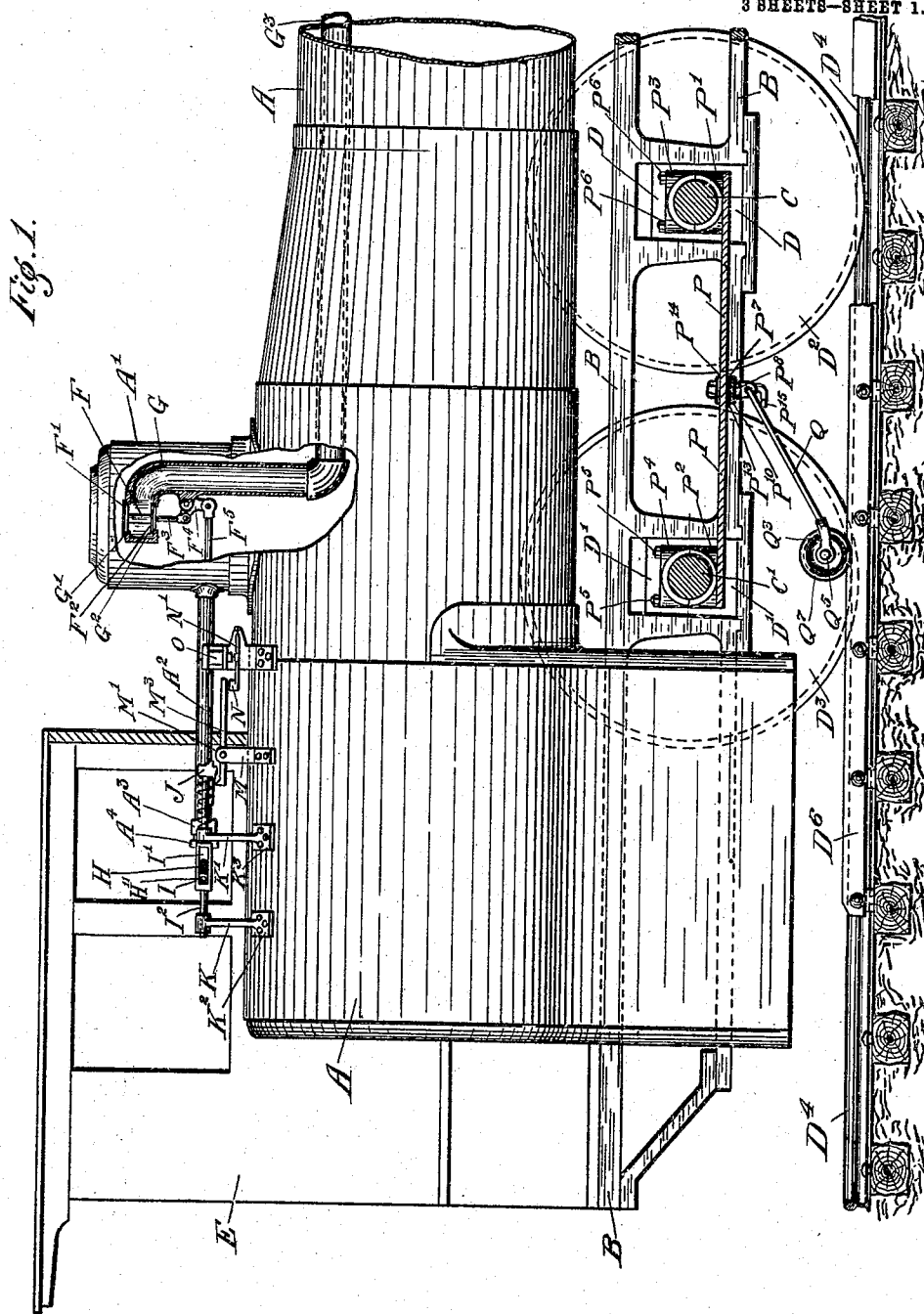


T. C. MASON.
 APPARATUS FOR PREVENTING COLLISIONS ON RAILWAYS.
 APPLICATION FILED FEB. 24, 1908.

937,377.

Patented Oct. 19, 1909.

3 SHEETS—SHEET 1.



Witnesses :-

Richd G. V. Mylton
Ida M. Daskam.

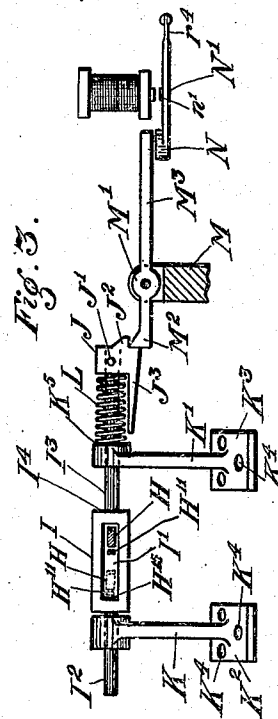
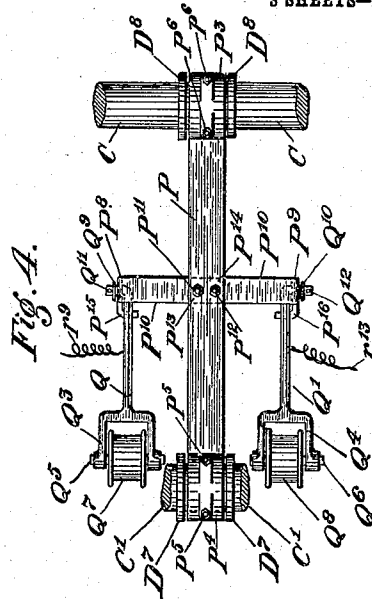
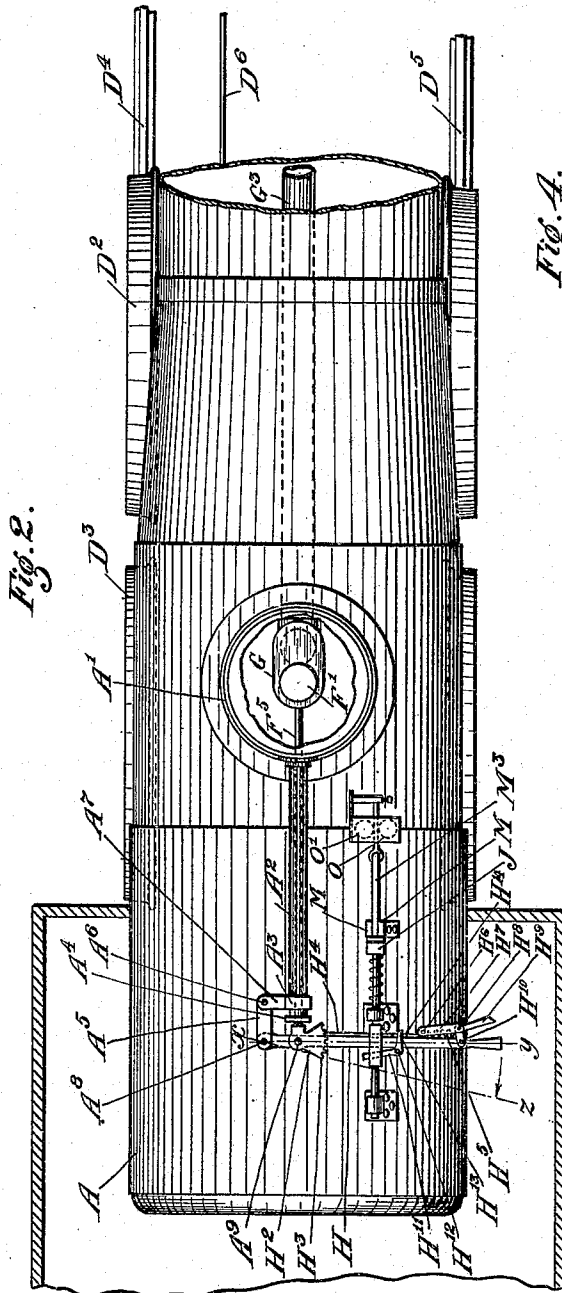
Inventor
Thomas C. Mason.

By *John Day*
Attorney.

APPARATUS FOR PREVENTING COLLISIONS ON RAILWAYS.

937,377.

3 SHEETS—SHEET 2.



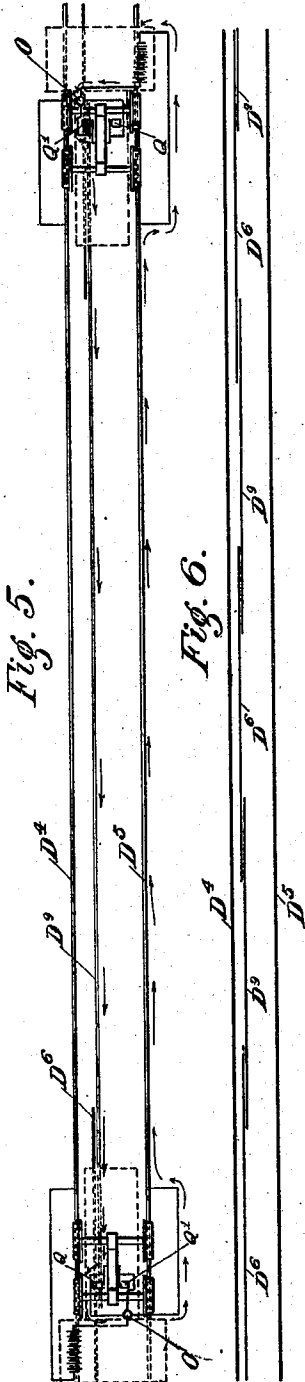
Rich^d V. Mytton
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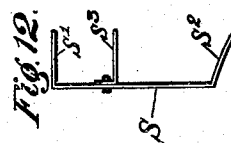
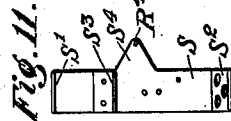
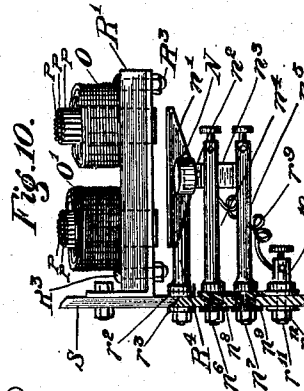
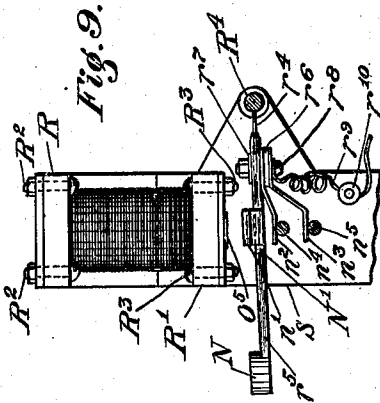
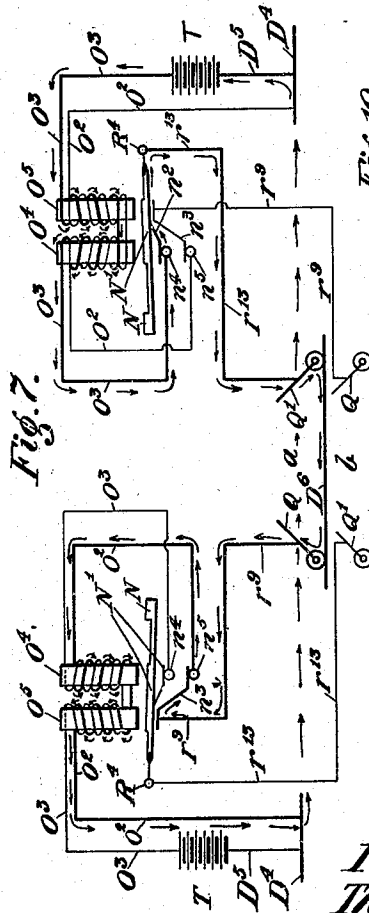
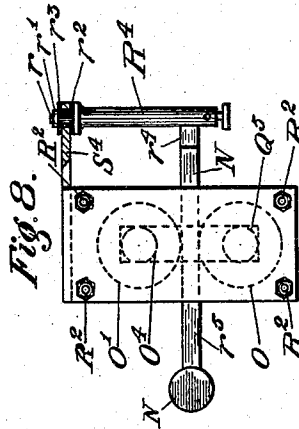
Patented Oct. 19, 1909.
 3 SHEETS—SHEET 3.

937,377.



Witnesses

Rich^d G. V. Mylton
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Inventor
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 Attorney.

UNITED STATES PATENT OFFICE.

THOMAS C. MASON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO MECHANICAL & ELECTRICAL APPLIANCES COMPANY, INCORPORATED, OF CARSON CITY, NEVADA.

APPARATUS FOR PREVENTING COLLISIONS ON RAILWAYS.

937,377.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed February 24, 1908. Serial No. 417,694.

To all whom it may concern:

Be it known that I, THOMAS C. MASON, of the city of Los Angeles, in the county of Los Angeles and State of California, have invented new or Improved Apparatus for Preventing Collisions on Railways, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, and to the letters and figures marked thereon.

My said invention which relates to apparatus or means for preventing collisions on railways operated by steam locomotive engines, performs its functions by establishing certain electrical connections between two locomotive engines approaching each other upon the same railway track, and at a predetermined minimum distance from each other, and in such manner that the electrical apparatus or means carried by each of such locomotive engines operates to close the throttle valves of both the locomotive engines, thereby cutting off the flow of steam from the boiler of each locomotive engine, and stopping the operating action of the steam upon the pistons in the cylinders of both of such locomotive engines, thereby bringing the engines when traveling either alone, or with trains attached thereto, to a stop or standstill.

The electric current used for the purposes of this invention is generated either by primary or secondary batteries, or by a dynamo carried upon each of the locomotive engines, and transmitted from the electrical apparatus upon one of the engines to the electrical apparatus on the other of the engines by means of an insulated third rail. In this third rail is a series of breaks for electrically disconnecting portions of said third rail arranged as hereinafter described.

In operation the current is taken from the source of supply or generation thereof upon one locomotive engine at a time and always from the locomotive engine approaching from a constant predetermined direction.

The current is delivered to, and received from the third rail by means of trolleys carried by locomotive engines as hereinafter described.

Upon the annexed drawings Figure 1, is a side elevation of part of a locomotive engine showing the device constituting my inven-

tion as applied thereto. Fig. 2, is a plan of the same corresponding to Fig. 1. Fig. 3, is a side elevation of part of the device drawn upon a larger scale than in Figs. 1, and 2, and shown as detached from the locomotive engine. Fig. 4, is a plan of the trolleys with their carrying frame, and portions of the axles of the locomotive engine. Fig. 5, is a diagrammatic plan illustrating two locomotive engines approaching one another from opposite directions (showing the direction of the electrical current.) Fig. 6, is a diagrammatic plan on a smaller scale than in Fig. 5, of a portion of railway track and third rail as used according to my invention, and illustrating a series of breaks and laps in the third rail. Fig. 7, is a diagram illustrating in detail the part of the electric current between two locomotive engines equipped with the safety device or apparatus constituting my invention. Fig. 8, is a plan of the electro-magnets and adjuncts. Fig. 9, is a side elevation of the electro-magnets and adjuncts, the lower portion of the carrying bracket being broken away. Fig. 10, is an end elevation of the electro-magnets and adjuncts, the upper portions being broken away. Fig. 11, is a side elevation of the bracket carrying the electro-magnets. Fig. 12, is an end elevation of the bracket carrying the electro-magnets.

In Figs. 1, and 2, the part marked A, is a portion of a locomotive engine having the steam dome A', and wherein also the parts marked B, represent a portion of the frame of the engine.

The driving axles are marked C, and C', and the axle boxes D, and D', and the cab is marked E. The driving wheels being marked D², and D³, the outer rails D⁴, and D⁵, and the third rail D⁶.

The throttle valve F, may be of any well known construction as shown in Fig. 1, which is there represented as consisting of an upper and a lower circular or disk portion F', and F², respectively, connected by a stem. Each of the parts F', and F², when the valve F, is closed, rest upon the seats G', and G², of the throttle box G, and when so closed shut off the steam from the steam chest, cylinders, slide valves and pistons of the locomotive engines.

The upper portion F', of the throttle

valve F, being of larger area than the lower portion F², the valve F, is normally held closed by the pressure of the steam upon a surface equal to the difference between the two areas of the upper and lower portions F¹, and F², less the area of the cross section of the throttle rod F³, added to the weight of the valve and some of its adjuncts.

In the apparatus constituting my invention as shown upon the drawings, the throttle valve F, is attached to a stem F³, pivotally connected to the bell-crank F⁴. The opposite arm of said bell crank F⁴, being connected to the horizontal throttle rod F⁵, which passes out in rear of the dome A', through the pipe A², provided with a stuffing box A³, and gland A⁴, at the outer end thereof, as shown in Figs. 1, and 2.

Upon the bracket A⁷, there is a rocking arm A⁵, pivoted upon a fixed fulcrum A⁶, at one end. At the other end of the rocking arm A⁵, is a movable fulcrum A⁸, upon which one end of the throttle lever H, is pivoted. At a short distance from the fulcrum A⁸, the throttle lever H, is pivotally connected at A⁹, with the outer end of the horizontal throttle rod F⁵, which is here provided with a locking device such as the quadrant H², having teeth H³, upon its periphery, normally held in engagement with the latch H⁴, which is forced between the teeth H³, of the quadrant H², by the spring H⁵, upon the lever H. The latch H⁴, at its outer end is pivotally connected at H⁶, to an arm H⁷, whose opposite end is pivoted at H⁸, to the latch-trip H⁹, which is pivoted at H¹⁰, upon the lever H.

In the position shown in Figs. 1, and 2, wherein the center line of the lever H, coincides with the line *x-y*, the throttle-valve F, is held closed. When it is required to start the engine by opening the throttle-valve F, the latch-trip H⁹, is grasped and pressed toward the lever H, and through the arm H⁷, withdraws the latch H⁴, from engagement with the toothed quadrant H². The lever H, is then moved outwardly upon the fulcrum A⁸, and when its center line coincides with the line *x-z*, Fig. 2, then the throttle is opened to the full extent. Variation in the position of the lever H, between these extremes, results in a proportionate lesser degree of opening of the throttle-valve F.

A movement of the throttle lever H, in the direction of the arrow (Fig. 2) serves to open, and a movement in the opposite direction serves to close the throttle-valve F, and by varying the extent of these movements the quantity of steam passing through the throttle-valve is adjusted.

The foregoing description of the drawings relates to parts of the apparatus which I use for being operated, and it is to be under-

stood that these parts do not constitute any portion of my invention.

My safety device consists of the bell-crank lever H¹², having a long arm H¹¹, and a short arm H¹³, engaging with an upwardly extending lug H¹⁴, upon the latch H⁴, whereby when the arm H¹¹, is pressed toward the throttle lever H, the latch H⁴, is drawn out of engagement with the quadrant teeth H³.

In my device there is also the yoke I, having a slot I', which is adapted to fit loosely over the throttle-lever H, the slot being of such a length that when the yoke is in the position shown in Fig. 3, the lever H, may be moved into a position corresponding to the full open or closed position of the throttle-valve F. The yoke I, is provided at one end with a guide portion I², of circular or other suitable cross section, and at its opposite end with a similar but longer portion I³, to the extremity of which a block J, is attached, by the pin J'. The block J, is provided with a lip J², at its extremity, and a wedge-shaped portion J³, below. Mounted upon the boiler A, are the guides K, and K', having feet K², K³, enabling them to be attached to the boiler A, by bolts or rivets passing through holes K⁴.

Between the faces K⁵, of the guide K', and of the block J, is interposed a spring L, which is shown extended in Figs. 1, and 2, and compressed in Fig. 3, and which normally serves to hold the face I⁴, of the yoke I, in contact with the guide K'. Pivoted upon a bracket M, attached to the boiler A, is a lever or trip M', provided upon opposite sides of its fulcrum with a short portion M², adapted to engage with the block J, and a long portion M³, adapted to be struck by a hammer N, mounted upon an armature N', capable of attraction by the electro-magnet O, and hereinafter more fully described.

Upon two of the locomotive axles C, C', and held in a central position thereon by means of the collars D⁷, D⁸, rigidly attached to the axles, Fig. 4, is a trolley carrying frame P, having bearings P', P², with caps P³, P⁴, respectively, attached to each, and to the frame P, by bolts P⁵, P⁶. A crossbar P¹⁰, Figs. 1, and 4, with depending ends P⁸, P⁹, is attached to the frame P, by the bolts P¹¹, P¹², but insulated therefrom by the washers P¹³, P¹⁴. The ends P⁸, P⁹, of the crossbar P¹⁰, are further provided with depending stops P¹⁵, P¹⁶. Pivotally connected to the ends P⁸, P⁹, their downward motion limited by the stops P¹⁵, P¹⁶, are the trolley bars Q, Q', provided with forked ends, (sometimes designated trolley harps) Q³, Q⁴, in which are journaled the axles Q⁵, Q⁶, of the flanged trolley wheels Q⁷, Q⁸. The pivoted ends of the trolley bars Q, Q', are held in place in the ends P⁸, P⁹, of the bar P¹⁰, by washers Q⁹, Q¹⁰, and pins Q¹¹, Q¹². The electro-magnets O, O', Figs. 1, 2, 8, 9, and

10, are placed side by side, and the winding consists of two insulated wires O^2 , O^3 , shown in Fig. 7, simultaneously wound upon the core O^4 , then upon the core O^5 , the cores O^4 , and O^5 , consisting each of the usual bundle of soft iron wires p . The upper and lower ends of the cores O^4 , and O^5 , are held by the blocks of insulating material R , R' , respectively. The coils as a whole are attached by bolts R^2 , R^3 , to the bracket S , separately shown on a smaller scale in Figs. 11, and 12. The bracket consists of a vertical portion S , an integral horizontal upper portion S' , and an attached horizontal portion S^3 . (The specific construction of the bracket may, however, be varied.) As shown in the drawings the bracket S , is provided at the base with a foot S^2 , to admit of its attachment by bolts to the boiler A . The bracket is further provided with a projecting lug S^4 , Fig. 11, to which is attached the binding-post R^4 , by a threaded end r , and nut r' , but insulated therefrom by the thimble r^2 , and washer r^3 . To the binding-post R^4 , below, and midway between the vertical axes of the coils, is attached the armature N' , consisting of the spring n^4 , the body portion n^5 , the hammer end N , and the cross-bar n' , which latter spans the lower ends of the cores O^4 , O^5 . A contact spring n^2 , is rigidly attached by brazing or otherwise, to the armature N' , and below it and insulated therefrom, and from the armature N' , by the washers n^6 , and n^7 , is another contact spring n^3 , attached to the armature by the bolt n^8 , to which is also attached the wire n^9 , which is connected to the binding-post n^{10} , and thence to the trolley bar Q . The binding-post n^{10} , is connected to the bracket S , by the screw portion n^{11} , and nut n^{12} . The springs n^2 , and n^3 , respectively, make contact with the binding-posts n^4 , n^5 , which are connected to the bracket S , by nuts n^6 , n^7 , and insulated therefrom by the insulating washers n^8 , n^9 .

For the sake of graphical clearness in the diagram Fig. 7, the electro-magnets O , O' , are shown in a plane at right angles to that in which they are shown in Figs. 1, and 2, and the trolley arms Q , and Q' , of each locomotive engine are shown one above the other, instead of side by side. The portion of the diagram Fig. 7, to the right of the vertical center line $a-b$ represents the electrical equipment of a locomotive engine approaching from a given direction, and the portion to the left of the center line $a-b$, the similar equipment of a locomotive engine approaching from the opposite direction. The third rail Fig. 6, through which the electric current passes from one locomotive to the other; consists of a series of sections D^6 , placed parallel to, and distant from one of the rails as D^4 , about one fourth of the distance between the centers of the rails D^4 , D^5 , in line about half a mile apart, and a

second series of sections D^9 , placed close to the front, overlapping them, and spanning the spaces between them. The sections D^6 , D^9 , of the third rail are insulated from one another and from the ground.

In Fig. 7, the source of the electric current is indicated as a battery T , and the wires in the closed circuit through which the current is passing are indicated by heavy lines, and those in the open circuit, by light lines. When the oppositely connected trolley-wheels Q , Q' , upon the two locomotives are simultaneously resting upon the same individual section of D^6 , or D^7 , of the third rail, the safety devices become operative. The path of the electric current is from right to left of the diagram Fig. 7, from the battery T , it passes in the direction of the arrows through the wire O^3 , through its several convolutions, around the magnet cores O^5 , O^4 , in succession, to the binding-post n^4 , thence through the contact spring n^2 , the armature N' , the connection R^4 , the wire n^3 , the trolley Q' , to the third rail D^6 , thence to the opposite locomotive at the left of Fig. 7, through the trolley wheel Q , wire n^9 , through the contact spring n^3 , (which is insulated from the armature N'), through the binding-post n^5 , the wire O^2 , around the magnet cores O^4 , O^5 , in succession, and being then grounded upon the locomotive, from thence it passes to the rails D^4 , to D^5 , in the direction of the arrows through the conductor D^5 , to the other pole of the operating battery T , upon the other locomotive. The current in its passage around the cores O^4 , O^5 , magnetizes them and causes them to attract the armatures N' , against the resiliency of their springs n^4 .

In order that the throttle valves upon both of the locomotives may be closed by the passage of the electric current through the system comprised by the two locomotives, the railroad track, and the third rail; the throttle-valve F , upon each of the engines, is opened to the full extent by the movement of the throttle lever H , in the direction of the curved arrow in Fig. 2. The position of the throttle lever H , in the slot I' , of the yoke I , and of the bell-crank arm H^{11} , are indicated by dotted lines in Fig. 3, the bell-crank arm H^{11} , bearing against the inside face H^{14} , of the yoke I . The lever H , is also shown in cross section in full lines in its position in the slot I' , corresponding to the closed position of the throttle-valve F .

When the yoke I , is placed in the position shown in Fig. 3, the spring L , is compressed between the face K^5 , of the guide K' , and the block J . The parts are then held in the relative positions shown in Fig. 3, by the arm M^2 , of the trip lever M' , engaging with the notch in the block J , beneath the lip J^2 .

When the electrical circuit is completed between the two locomotives, the following

action takes place on both locomotives; the electro-magnets attract the armature N' , its hammer end N , striking upon the longer arm M^3 , of the lever M' , and releasing its
 5 opposite and shorter end M^2 , from engagement with the block J , which immediately springs back under the expansion of the spring L , drawing with it the yoke H , whose inner face H^{15} , strikes the arm H^{11} , of the
 10 bell-crank H^{12} , thus withdrawing the latch H^4 , from engagement with the quadrant H^2 , and releasing and carrying with it, the throttle lever H , to the position shown in Fig. 2, thus closing the throttle valve F .

15 After the parts of the throttle closing device have been placed in the position shown in Fig. 3, the throttle lever may be operated by hand between the limits of its motion in the slot I' ; and the closing device is equally effective when the throttle valve F , is only
 20 partly open.

In order to insure the effectiveness of the hammer N , upon the lever M^3 , the hammer N , is made to undergo a series of rapid
 25 strokes or vibrations as the attraction of the magnets for the armature N' , causes the contact springs n^2 , and n^3 , to break the electrical circuits by drawing them out of contact with the binding posts n^4 , n^5 , respectively,
 30 the contacts being remade by the reflex action of the armature spring n^4 .

It is to be understood that the apparatus or mechanism constituting my invention is wholly inoperative excepting when two locomotive engines approaching each other have
 35 one of the trolleys of each locomotive engine in contact with one and the same overlapping section of the third rail of the railway hereinbefore described, whereby the circuit
 40 between the electrical apparatus on each locomotive engine is placed in circuit with the electrical apparatus on the other locomotive, the apparatus being thereby operated to close the throttle-valve on both the locomotive engines all in the manner hereinbefore set forth.
 45

I claim as my invention.

1. In a locomotive engine adapted for traveling upon a third rail railway whose
 50 third rail is constructed of overlapping sections, the combination of a bell-crank lever pivoted upon the throttle lever, and adapted to engage the throttle lever latch, a yoke secured to guide portions of different lengths, and having a central slot adapted to fit loosely over said throttle lever; guides for said guide-
 55 said guide-
 60 portions, a block secured to the longer of said guide portions, and a spring between the adjacent faces of said block and one of said guides, whereby the throttle valve is normally held in a closed position, operating in the manner and for the purposes substantially as set forth.

2. In a locomotive engine adapted for
 65 traveling upon a third rail railway whose

third rail is constructed of overlapping sections, the combination of a bell-crank lever having arms of different lengths, pivoted upon the throttle lever and engaging the
 70 throttle lever latch; a yoke having a central slot adapted to fit loosely over the throttle lever and the longer arm of said bell-crank lever, exterior guide portions of different lengths upon said yoke, guides for said guide
 75 portions, a block secured to the longer of said guide portions and having a projecting lip and a depending wedge-shaped portion, a spring between the adjacent faces of said block and one of said guides, and a trip lever pivoted upon a bracket and adapted to en-
 80 gage said block when the throttle valve is opened to the full extent and the spring is compressed, all constructed and operated in the manner substantially as specified.

3. In a locomotive engine adapted for
 85 traveling upon a third rail railway whose third rail is constructed of overlapping sections, the combination of a bell-crank lever pivoted upon the throttle lever, a yoke surrounding the throttle lever and said bell-
 90 crank lever, guide portions of said yoke, guides for said guide portions attached to the boiler, a block upon one of the guide portions, a spring between said block and one of the guides, a trip-lever adapted to engage
 95 said block when the spring is compressed, and pivoted upon a bracket attached to the boiler; an electro-magnet carried by a bracket upon the boiler and provided with an armature having a hammer head adapted
 100 to release said trip-lever from engagement with said block when an electric current is passed through the coils of the electro-magnet, in the manner and for the purposes substantially as specified.
 105

4. In a throttle closing device, the combination of a yoke embracing the throttle lever and having a guide portion, a block attached thereto, a guide for said guide portion, a spring between said block and said
 110 guide, a pivotally mounted trip-lever adapted to engage said block when the spring is compressed; an armature having a hammer head adapted to strike said trip-lever and release said spring when said armature is elec-
 115 trically attracted, and means for attracting said armature when two locomotives are approaching one another upon the same track, substantially as set forth.

5. In a throttle closing device, the combination of a yoke embracing the throttle lever, a guide portion upon the yoke, and passing through a guide, a block attached to the guide portion, a spring between the
 120 block and the guide adapted to close the throttle valve when said spring is released, and admitting of the valve being opened when the spring is compressed, a trip-lever engaging said block when said spring is compressed, an armature having a hammer
 130

end adapted to strike said trip-lever and release said spring when said armature is electrically attracted, and an electro-magnet adapted to attract said armature, substantially as set forth.

6. In a locomotive engine adapted for traveling on a third rail railway whose third rail is constructed of overlapping sections, the combination of a slotted yoke embracing the throttle valve lever, guide portions for said yoke, guides for said guide portions, a block attached to one of said guide portions, a spring between said block and one of said guides, a trip-lever pivoted upon a bracket and adapted to engage said block when the spring is compressed; an armature having a hammer head adapted to strike said trip-lever when electrically attracted, an electro-magnet adapted to attract said armature, and a trolley frame journaled upon the axles of the locomotive and carrying two electrically insulated trolley harps and wheels, substantially as set forth.

7. In a locomotive engine adapted for traveling on a third rail railway whose third rail is constructed of overlapping sections, the combination of a spring operated throttle valve closing device having a trip-lever, with an armature adapted to strike said trip-lever and release said spring, whereby the throttle valve is closed, and an electro-magnet adapted to attract said armature, whereby the spring is released, substantially as set forth.

8. In a locomotive engine adapted for traveling on a third rail railway whose third rail is constructed of overlapping sections, the combination of a spring operated throttle valve closing device having a yoke and a spring, a trip-lever for holding said spring in compression, an armature for striking said trip-lever and releasing the spring, and an electro-magnet adapted to attract the armature and having two insulated wires simultaneously wound upon its cores, one wire above the other; a trolley carrying frame having an insulated cross bar with depending ends, depending stops upon said ends, trolley bars pivoted in said ends, harps upon said trolley bars, and trolley wheels journaled in said harps, substantially as set forth.

9. In a locomotive engine adapted for traveling on a third rail railway whose third rail is constructed of overlapping sections, the combination of a spring operated throttle valve closing device having a trip-lever, with an armature adapted to strike said trip-lever, and an electro-magnet adapted to forcibly attract said armature, said electro-

magnet having two separate cores with their axes parallel to one another and being wound successively; the winding consisting of two separate insulated wires wound simultaneously one above the other, upon each core, for the purpose of establishing two separate electrical circuits, one of which is open when the other is closed; said armature having a hammer head, a cross-bar spanning the ends of said cores, and a spring at the opposite end attached to an insulated binding-post, a contact spring rigidly attached to the armature and insulated binding-post to make contact with the spring, another contact spring above the first attached to the armature, but insulated therefrom, and from the other opening, an insulated binding-post for the last named spring, and a bracket attached to the boiler carrying the electro-magnets, the armature, and the binding-posts, substantially as set forth.

10. In, or with, a third rail railroad, the combination with a locomotive engine throttle valve closing device provided with a trolley for transmitting an electric current, and attached to said locomotive, of an insulated third rail consisting of a series of insulated sections placed parallel to and overlapping one another at a short distance from one of the rails of the track, said trolley being provided with two trolley bars and harps carrying trolley wheels, one of which wheels makes contact with the third rail for a given direction of motion of the locomotive, and the other for making such contact when the locomotive travels in the opposite direction, also means carried by the locomotive for generating an electric current and transmitting same through an electro-magnet having two separate windings acting upon the throttle valve closing device, thence through the trolley wheel electrically connected to one of the windings of the electro-magnet through said third rail, thus completing the circuit through a similar throttle valve closing device upon another locomotive similarly equipped and approaching the first mentioned locomotive upon the same track, and having its trolley wheel which is in contact with the third rail connected with the opposite winding of said electro-magnet cores and thence grounded, substantially as set forth.

In testimony whereof, I have hereunto set my hand and seal at the city of Los Angeles aforesaid, in the presence of two subscribing witnesses.

THOMAS C. MASON. [L. s.]

Witnesses:

ST. JOHN DAY,
J. D. CORY.