J. T. THOMPSON.

SIGNAL OR CONTROL MECHANISM FOR RAILWAY TRAINS.

APPLICATION FILED JAN. 5, 1912.

1,068,024.

Patented July 22, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

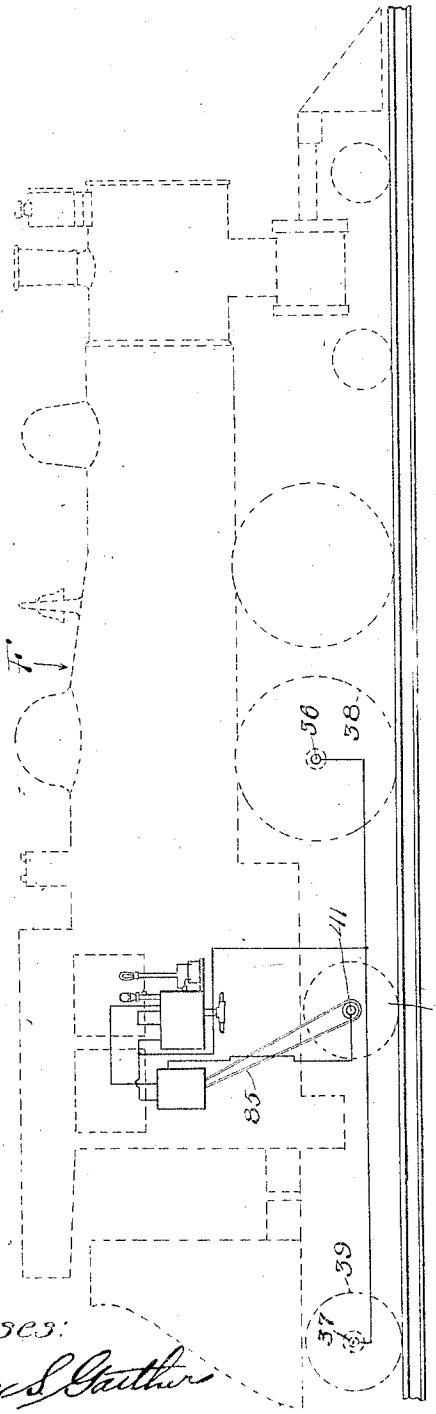


Fig. 3.

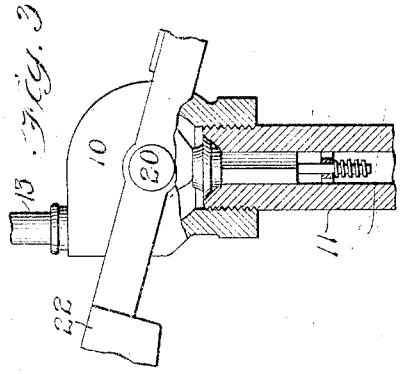
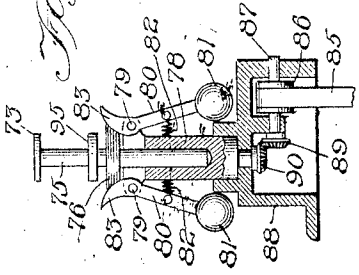


Fig. 2.



Witnesses:

Harry S. Gauthier

William Goldberger

Inventor

James T. Thompson

William L. Hall

by

Attorney

J. T. THOMPSON.

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2 SHEETS—SHEET 2.

Fig. 4.

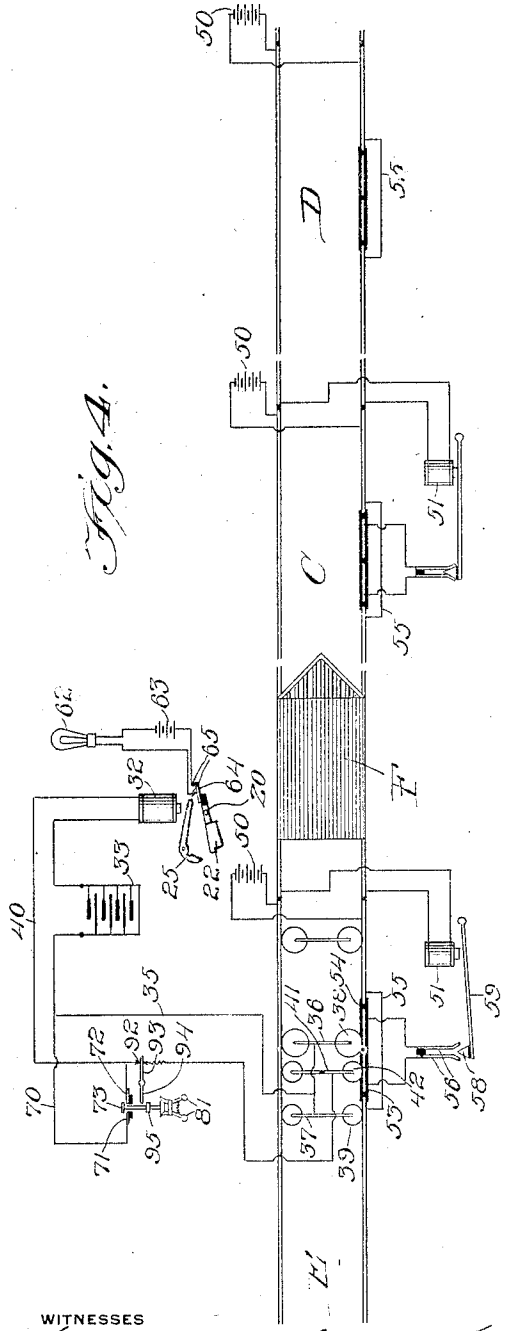
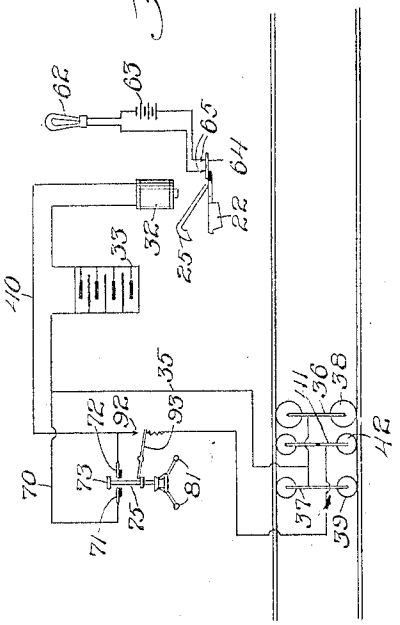


Fig. 5.



WITNESSES

Harry L. Gaither

William Goldberger

INVENTOR

James T. Thompson

by William Wallace Hall,

Atty

UNITED STATES PATENT OFFICE.

JAMES T. THOMPSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE THOMPSON AUTOMATIC SIGNAL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF SOUTH DAKOTA.

SIGNAL OR CONTROL MECHANISM FOR RAILWAY-TRAINS.

1,068,024. Specification of Letters Patent. Patented July 22, 1913.

Application filed January 5, 1912. Serial No. 669,556.

To all whom it may concern:

Be it known that I, JAMES T. THOMPSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Signal or Control Mechanism for Railway-Trains; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to a system of electric signal or control for railway trains by which to indicate to the engineer, or to arrest or modify the movement of the train, when the train is on an unsafe or prohibited part of the track, and the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation, in dotted lines, of a locomotive equipped with my invention. Fig. 2 is a sectional view of a governor constituting part of my controlling or signaling apparatus. Fig. 3 is a sectional view illustrating the release valve of the train air line pipe controlled by my improved mechanism. Fig. 4 is a diagrammatic view illustrating a track section composed of a plurality of signal blocks equipped with a simple form of signaling system, and illustrating diagrammatically in connection therewith the signal or control device. Fig. 5 is a similar view of the controlling circuit and devices carried principally by the engine, with the parts in changed positions.

As shown in the drawings, 10 designates a release valve of the train line air pipe that is located in a branch 11 of the train pipe 12. The valve 10 comprises a tapered plug 16 that seats against an upwardly facing conical seat in the upper end of the pipe 11 that extends into the valve casing 18 and is provided with a guide stem 17 that is guided in said pipe 11. Said valve is normally held against its seat against the pressure of air in the train pipe, so as to seal the pipe 11 by means of a cam arm 19 fixed to the rock shaft 20 mounted in the wall of the valve casing, and to said rock shaft is fixed a lever arm 22. The arm 20 is adapted to be normally maintained in a position to hold the air release valve closed by the action of a magnet 32, included in a normally closed circuit, the parts being so arranged that when the circuit is opened and the magnet is deënergized, the lever swings on its pivot to open said valve. The lever 22 may be a gravity operated lever and arranged to be normally held in position to close the valve by engagement with a pivoted latch 25 one end of which constitutes a pole piece for contact with the magnet 32 and the other end of which is notched for engagement with the free end of the lever 22. In this construction the lever drops by gravity out of engagement with the latch when the pole end of the latch drops away from the deenergized magnet 32.

The electromagnet 32 is included in a normally closed circuit, best shown in Fig. 4, which circuit also includes a battery, or other source of energy 33, one side of which battery is connected by the wire 35 to the axles 36 and 37 of the rear drive wheels 38 of the engine and the front wheels 39 of the tender, respectively. The other side of said battery is connected, through the magnet 32, by the wire 40 to one end of the axle 41 of the rear wheels 42 of the locomotive. The ends of the axle 41 are insulated from each other and the axles 36, 37 are insulated from their boxes and the engine and the tender frames. When said wheels 38, 39 and 42 are running on electrically continuous rails, or rails that are bonded together, the battery 33 and the magnet 32 are in a circuit which is maintained closed through one of the wheels 42 and the adjacent end of its axle 41, and through one or the other, or both, of the wheels 38, 39 at their axles 36 and 37. The circuit described constitutes a controlling circuit which is movable with the engine or train, and an interruption of such circuit has the effect to deënergize the relay 32 and thereby permit the train control device or a signal associated with said circuit to operate.

In Fig. 4 is shown a section of track embracing two full signal blocks C, D and the far end of the block E, on which latter is traveling the contact wheels of the controlling circuit of the engine F. The several blocks are equipped with a familiar form of signaling apparatus, in which there is em-

ployed at the far end of each block a battery 50, bridged across the track rails which controls a relay magnet 51, bridged across the track rails at the entering end of the block. One of the track rails adjacent to the end of the block is provided with two relatively short rail sections 53, 54 which are insulated from each other and from the regular track rails, and are sustained by fish plates extending across the two rail sections. Bond wires 55 extend around said insulated rail sections to maintain electric continuity of the track rails of the blocks. 56, 56 designate spring terminals which are insulated from each other and are connected to the rails sections 53, 54, and said terminals are adapted to be connected by means of contacts 58 carried by swinging armatures 59 that are acted upon by the track relay magnets 51. The lengths of the rail sections 53, 54 are such, with respect to the distances apart of the wheels, 38, 39 and 42, that when the wheels 38 and 42 are traveling, one on one short rail section and the other on the other rail section, the wheel 39 is traveling on the regular track rail in rear of the insulated sections, but said latter wheel will reach the rail section 53 before the wheel 38 has passed off the section 54. If it be assumed in Fig. 4 that the contact 58 is closed upon the spring terminals 56, the circuit of the magnet 32 and the battery 33 will be closed from one side of the battery 33 through the wire 40, the wheel 42, rail section 53, the spring terminals 56 to rail section 54, and thence through the wheel 38 and axle 36 back to the other side of the battery. When the wheel 38 passes off the insulated rail section 54 the wheel 39 will have passed onto the insulated rail section 53, so that the circuit will, at such time, be closed through the wheel 42, the rail section 54, spring terminals 56, rail section 53 and wheel 39 and its axle 37 back to the battery 33.

In the foregoing description it has been assumed that the circuit is closed at the contacts 56. The said terminals 56, when closed by the contact 58, and the rail sections 53, 54 connected thereto constitute, when the contact wheels 38, 39 and 42 are passing thereover, a loop or partial local circuit through which the controlling circuit is maintained closed, notwithstanding the interruption in the track rail due to the insulation between the rail section and the regular track rails, so that there will be no break in the controlling circuit, and the train will pass over said insulated rail sections without operating the train control device or signal apparatus. If the loop be open by the separation of the contact 58 and the terminals 56, however, as shown in block E in Fig. 4, the controlling circuit will be interrupted or opened when the wheels 38, 39 and 42 pass over the insulated rail sections, with the result of de-energizing the magnet 32 and operating the train control device or signal or both. The said loop or partial local circuit may be opened at the terminals 56 in any convenient manner to effect this result, as for instance, by the throwing of a switch, a semaphore, the opening of a bridge or by otherwise short circuiting the track relays 51.

If desired I may employ, in connection with the train control device, a visual signal device, embracing a lamp 62, included in the circuit of a battery 63, the two sides of which are adapted to be closed by a contact piece 64 on the rear or tail end of the valve actuating arm 22, said contact piece being adapted for engagement with the terminals 65 of the circuit of the battery 63.

In accordance with my invention, I provide means whereby the controlling or signaling device will be rendered inoperative under a certain predetermined speed of the train or at such low speed at which the train may safely enter a block in which the signals are set against the train to indicate either a full stop or caution, so that when the train is running at the predetermined minimum speed, it will not be arrested or the signal operated. I propose also to so arrange the mechanism that the train control or signal device will be operated at a predetermined maximum speed of the train, or at such speed beyond which it may be determined it is not safe to operate the train. I may effect these results by the use of a suitable governor device, controlled by the speed of the train and adapted to shunt the controlling circuit or to operate switching or cut out terminals in the operating circuit, and have herein shown one convenient form of mechanism for this purpose which I will now describe.

Arranged in the controlling circuit is a branch wire 70 connected between the wires 35 and 40, contacts 71, 72 and a bridge piece 73 adapted at certain times in the operating of the mechanism to bridge between said contacts and connect the branch circuit between the wires 35 and 40. When the bridge piece 73 connects the contacts 71, 72 the path of the circuit, which includes the battery 33 and the magnet 32, will be shorter or of lower resistance through the branch 70 than through the complete circuit before described, so that the operating circuit will be shunted at such time through the branch circuit.

The bridge piece 73 is shown as formed on the upper end of a governor controlled, vertically movable stem 75, which is provided below the bridge piece with a disk 76 (Fig. 2) having an inclined or conical periphery. The said stem 75 is mounted and vertically movable in a rotatable frame 78 to which

are pivoted at 79 governor arms 80 having weights 81 at their lower ends and normally held with their weighted ends drawn inwardly by the springs 82. The upper ends of said governor arms, beyond their pivots, are convexly rounded at 83 to engage with the conical periphery of the disk 76 in such manner that when the governor arms are thrown outwardly by centrifugal action the disk and the stem are caused to rise, thereby raising the bridge piece 73 away from the contacts 71, 72 and opening the branch circuit 70, whereupon the circuit will be established through the track wheels 38, 39, and 42 and the track rail. The rotatable frame 78 may be driven from one of the axles of the locomotive, as the axle 41, as herein shown, by means of a belt 85 about a pulley 86 fixed to a shaft 87 that is rotatively mounted in the governor casing 88; said shaft being provided with a pinion 89 that meshes with a pinion 90 fixed to the rotative governor frame 78. Through the means described, when the governor frame is rotated at a predetermined speed, the weights 81 are thrown outwardly by centrifugal action, against the action of the springs 82, and operate to raise the stem to disconnect the bridge piece 73 from the contacts 71, 72 of the branch circuit and cut the branch circuit out of the controlling circuit and to complete the controlling circuit through the wheels 38, 39 and 42, as described. The same governor device may be employed to open the normally closed controlling circuit at a time when the train attains predetermined maximum speed of the engine or train. As shown the controlling circuit embraces a stationary contact 92 and a pivotal switch 93 adapted for contact at one end thereof with the stationary contact 92. Said switch 93 has a laterally extending arm 94 which lies above a flange or disk 95 on the governor stem 75 between the bridge piece 73 and the disk 76. With this construction, upon a predetermined maximum rotative speed of the governor the stem 75 is raised sufficiently to bring the disk 95 into contact with the arm 94 of the switch lever 93 and thus open the operating circuit, with the same result as when the circuit is broken at the track rails; that is to say, to deënergize the magnet 32. Thus if it be assumed that the maximum safety speed of the train is ninety miles per hour, an increase of the speed beyond that will act on the governor to open the circuit at the switch 93 and thereby operate the train control device or signal, or both.

In Fig. 4 the parts of the governor and the parts associated therewith are in the positions which they assume when the train is running at a speed between the predetermined minimum speed at which the train control device and signal are inoperative and the predetermined maximum speed, the controlling circuit being at this time closed through the wheels 38, 39 and 42 and track rail. In Fig. 5 the parts are shown in a position which they assume when the train has passed a maximum speed, the switch 93 being shown as thrown over to open the operating circuit.

The track shown in Fig. 4 is one of the double track system. When applying improvements to a two way track, the system will be modified in a manner known to signal engineers.

It will be understood that the construction which I have herein shown is to be regarded as merely one form or example of my invention and that the invention in its broader aspect is capable of assuming varying forms.

I claim as my invention:—

1. A signal or control mechanism for railway trains embracing a controlling or signaling device carried by the train, a member arranged when in one position to maintain said device inoperative and when in another position to render the device operative, an electromagnet carried by the locomotive arranged to hold said member in position first mentioned, a normally closed controlling circuit including said magnet, a battery and contact devices, which latter travel on the track rail, said contact devices being insulated from each other, means at the track rail for opening said normally closed circuit between the contact devices, and means between the contact devices and the battery, controlled by the speed of the train, for automatically opening one side of said circuit.

2. A signal or control mechanism for railway trains embracing a controlling or signaling device carried by the train, a member arranged when in one position to maintain said device inoperative and when in another position to render the device operative, an electromagnet carried by the locomotive arranged to hold said member in the position first mentioned, a normally closed controlling circuit including said magnet, a battery and contact devices, which latter travel on the track rail, said contact devices being insulated from each other, and a governor device controlled by the speed of the train arranged to open one side of the circuit at a point between the contact devices and said battery.

3. A signal or control mechanism for railway trains embracing a controlling or signaling device carried by the train, a normally closed controlling circuit arranged to normally maintain said device in inoperative position and embracing a suitable holding magnet, a battery and contact devices, which latter travel on the track rail, means at the track rail for opening the said controlling circuit, and means controlled by the

speed of the train and operating upon a predetermined maximum speed to open one side of the controlling circuit.

4. A signal or control mechanism for railway trains embracing a controlling or signaling device carried by the train, a normally closed controlling circuit arranged to normally maintain said device in inoperative position and embracing a suitable magnet, a battery and contact devices, which latter travel on the track rail, means at the track rail for opening the said controlling circuit, a branch circuit bridged between the two sides of the controlling circuit through which the controlling circuit may be completed and embracing stationary contacts and a bridge piece which bridges between said contacts, a normally closed switch for opening one side of the controlling circuit, and a governor controlled by the speed of the train for actuating said bridge piece and switch.

5. A signal or control mechanism for railway trains embracing a train controlling or signaling device carried by the train, a controlling circuit for said device including a battery and a contact, the latter adapted for contact with the railway track, with means for opening and closing the controlling circuit, and a governor device controlled by the speed of the train and operating upon a predetermined minimum speed of the train to shunt the controlling circuit to render said train controlling or signaling device inoperative with means operating upon a predetermined maximum speed of the train to act upon said controlling circuit to cause said latter device to operate.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 18th day of May A. D. 1911.

JAMES T. THOMPSON.

Witnesses:

WILLIAM L. HALL,

WILLIAM GOLDBERGER.