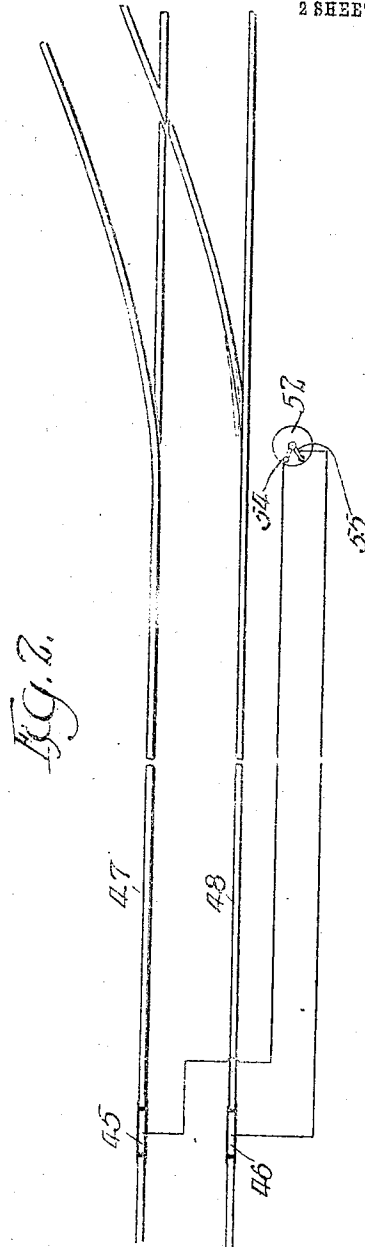
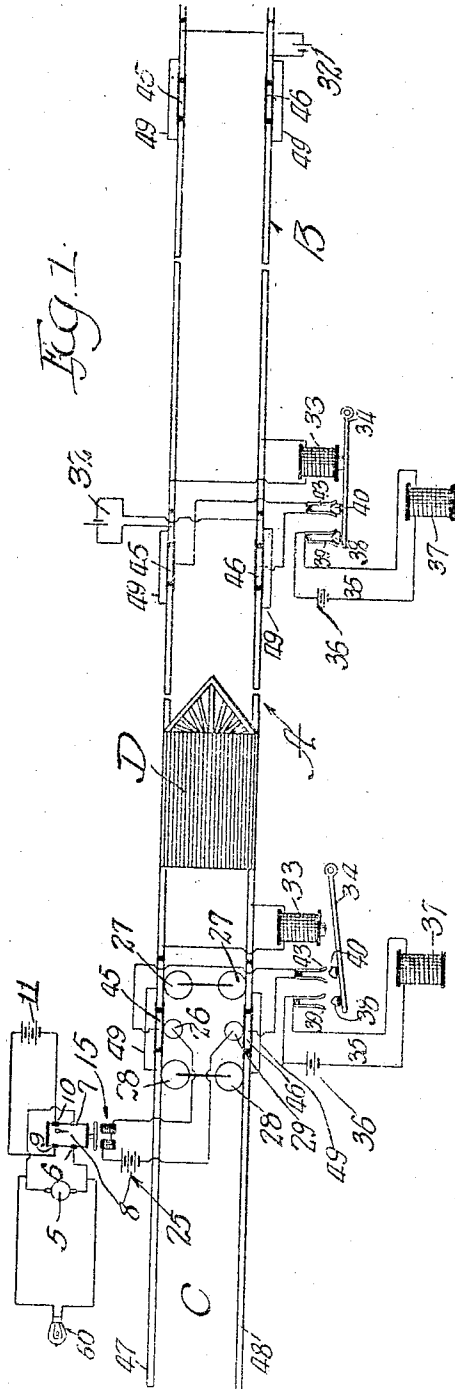


J. T. THOMPSON.
 SYSTEM OF ELECTRIC SIGNAL OR CONTROL FOR RAILWAY TRAINS.
 APPLICATION FILED FEB. 23, 1909.

952,054.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.



Witnesses:
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 D. R. McKinnis

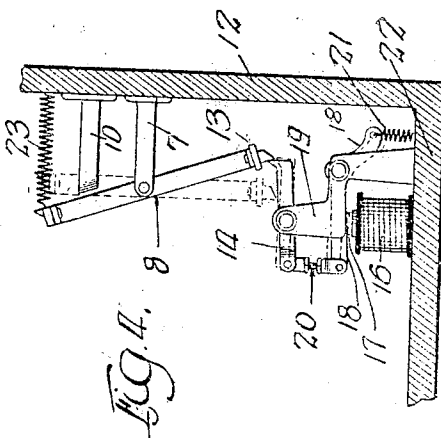
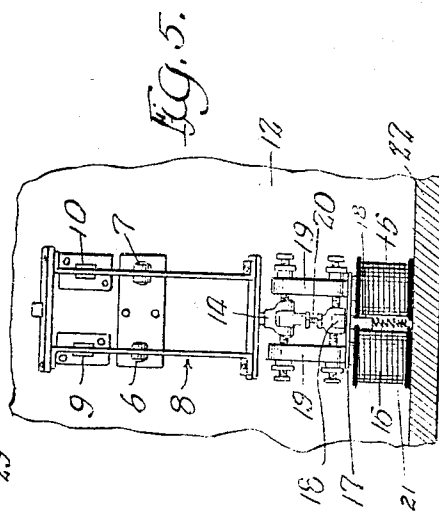
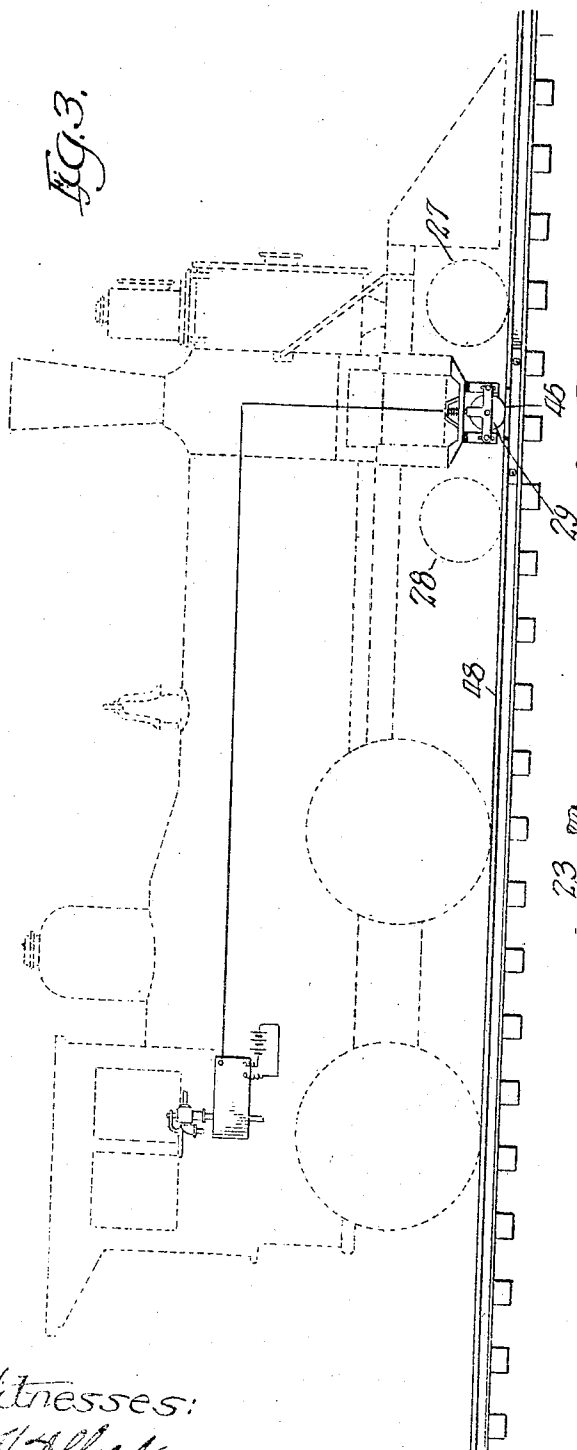
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JAMES T. THOMPSON, OF CHICAGO, ILLINOIS.

SYSTEM OF ELECTRIC SIGNAL OR CONTROL FOR RAILWAY-TRAINS.

952,054.

Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed February 23, 1909. Serial No. 479,404.

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 Systems of Electric Signal or Control 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 electrical signal or control for railway trains, and refers more specifically to a means for controlling the operating circuit of the signal or train control apparatus.

As herein shown, the train is equipped with a controlling apparatus like that illustrated in my prior U. S. Letters Patent Number 869,590, which is arranged to apply the brakes to and stop or arrest the train when attempt is made to drive it past a signal set at danger or to stop the train at other points along the track where provision may be made for controlling the train under predetermined or emergency conditions. Obviously, however, the operation herein shown may be readily adapted to signal systems or to train control apparatus which operate differently from that hereinabove referred to.

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 diagrammatic view illustrating a track section composed of two full signal blocks, equipped with a simple form of signaling system, and showing the electric controlling apparatus to which this invention relates. Fig. 2 illustrates an arrangement for controlling the signal or control apparatus at a turn out. Fig. 3 is a side elevation, in dotted outline, of a locomotive equipped with the automatic controlling apparatus. Fig. 4 is a view in side elevation of an electro-magnet used in the electric controlling apparatus. Fig. 5 is a view in end elevation of the electro-magnet illustrated in Fig. 4.

As shown in Fig. 1, a motor 5 for operating the brake apparatus is connected between the points 6 and 7 of a four point switch 8, to the other points 9 and 10 of which there is connected an operating bat-

tery 11. The said switch 8 is pivotally supported between its ends at the outer ends of the switch points 6 and 7, which are secured at their inner ends to an insulating plate 12. At its lower end the said switch is provided with a latch member 13 which is adapted to be engaged by a pivotally supported arm 14 controlled by the armature of an electro-magnet 15.

As illustrated in the drawings, (Figs. 4 and 5) the electro-magnet 15 embraces two coils 16, 16, and an armature 17. The said armature is secured to the lower side of a horizontally extending arm 18 which is pivotally supported at its inner end between two upwardly extending bracket arms 19, 19. At its outer end the said arm 18 is loosely connected by means of a link 20 to the outer end of the arm 14, which latter is pivotally supported on and between the upper ends of the bracket arms 19, 19. The inner end of the arm 18 is turned downwardly and a spring 21 is attached at one end to said downturned portion of the arm and at its other end to the base 22 which supports the magnet and brackets 19. Said spring tends to hold the armature away from the magnet. As will be seen from this construction, the inner end of the arm 14 will be held engaged with the latch member 13 when the magnet is energized, thus maintaining the switch 8 and the motor circuit normally open. When, however, the current through the electro-magnet is interrupted the spring acts through the arms 18 and link 20 to swing the rear end of the arm 14 away from the switch, whereupon the switch will be closed by the spring 23 which is connected at one end to the upper end of the switch and at its other end to the plate 12. The closing of the switch closes the motor circuit and the motor is started in operation to apply the brakes. If a signal device be employed instead of a train control device the closing of the switch 8, modified to suit the particular signal device, will close the signal circuit to indicate danger. The relay magnet 15 is energized by means of a battery 25 carried upon the engine (or car) and the circuit including the battery and relay is normally closed through the track rails, as will hereinafter more fully appear. The said relay magnet is electrically connected to a spring pressed wheel 26 (or it may be a brush) which is mounted between the front and rear wheels 27, 28 of

the front truck of the engine at one side thereof and is adapted to travel upon the track rails at one side of the track. A similar spring pressed wheel (or brush) 29 is in a like manner mounted on the other side of said front truck to travel on the track rails at the other side of the track and is electrically connected to the opposite side of the relay magnet through the battery 25. The said wheels 26 and 29 are insulated from each other and from the front and rear wheels of the front truck. When the said wheels 26 and 29 and the front truck wheels are running on electrically continuous rails, or rails that are bonded together, the battery 25 and relay magnet 15 will be in a circuit which is maintained closed through the contact wheels 26 and 29 and the front truck wheels and their connecting axles. The circuit at such time will be from one side of the relay magnet 15 through the contact wheel 26, thence along the track rail at one side of the track to the truck wheels 27, 28, through the axles thereof to the opposite truck wheels 27, 28, through the track rail at the other side of the track to the contact wheel 29, and thence through the battery 25 to the opposite side of the relay magnet 15. The circuit described constitutes a transient controlling circuit that is movable with the train and said circuit is normally closed. An interruption of said circuit has the effect to deenergize the relay magnet, whereupon the motor or signal circuit will be closed and thus arrest the train or operate a signal device, or both.

In Fig. 1 is shown a section of track embracing two full signal blocks A and B and a part of an advance block C, on which latter block is indicated one of the transient controlling circuits carried by an engine or train which may be designated as a whole at D. The several blocks of the track are equipped with a familiar form of block signaling apparatus in which there is employed at each block a track battery 32 bridged across the track rails which normally energizes a track magnet 33, the armature 34 of which controls a local signal circuit 35 located at the entrance to the block. The said signal circuit embraces a battery 36 and relay magnet 37 which, when energized, may operate a target or semaphore to indicate a clear track ahead. Said circuit is closed by a contact 38 on the armature 34 which, by the swinging movement of the armature, is moved into and out of contact with spring terminals 39, 39 included in said circuit. When a train D enters upon the block the track battery 32 will be short-circuited, thus deenergizing the track magnet 33 and opening the local signal circuit to display a danger signal.

My improved train control or signal apparatus may be connected with the block

signaling system referred to, or to other types of such signaling systems in such manner that when the track relay is short-circuited or its circuit opened, as by a broken rail, the transient controlling circuit of a train about to enter the short-circuited or open circuit block will be interrupted or opened and thereby control the train or actuate a signal on the train approaching the short-circuited block. One practical arrangement for effecting this result is herein shown and is made as follows: The armature 34 of the track magnet 33 is provided at its swinging end adjacent to the contact 39 with a second contact 40 which is adapted to short-circuit spring contacts 43, 43 which are electrically connected with two short rail sections 45 and 46 which are insulated from the track rails 47 and 48. The said short insulated rail sections 45 and 46 are located in the line of service rails and at a distance inside of the far end of the block. Bond wires 49, 49 extend around the insulated rail sections to maintain electric continuity of the track rails of each block in front and in rear of the insulated sections. Said insulated sections are of such length that when the contact wheels 26, and 29 are passing over the same, the wheels 27 and 28 of the front engine truck are riding upon the track rails adjacent to each end of the said short sections. The terminals 43 and insulated rail sections 45, 46 and their connecting wires constitute a loop through which the transient controlling circuit is closed at a time when the contact wheels (or brushes) 26, 29 are riding over the insulated rail sections and at which time the circuit is broken between said contact wheels and truck wheels. That is to say, the transient controlling circuit will be thus closed if the contact 40 is engaged with the spring terminals 43. When the loop is closed at the terminals 43 there will be no interruption of the transient controlling circuit and the train will pass over said insulated sections without operation of the train controlling or the transient signaling apparatus occurring. If the loop be open at the terminals 43, however, the transient controlling circuit will be interrupted as soon as the contact wheels 26, 29 pass upon the insulated rail sections, with the result of setting the train controlling or transient signaling apparatus in operation. Said loop or partial circuit may be opened at the terminals 43 in any convenient manner to effect this result. That is to say, it may be opened by the throwing of a switch or semaphore, the opening of a bridge or by the short circuiting of the track relay 33 in the signaling system shown in Fig. 1. In the latter event, assuming a train D to be on the block A (Fig. 1) and the track relay 33 of said block short circuited, the loop will be open at the

terminals 43. If now the contact wheels 28, 29 pass upon the insulated rail sections, the circuit through the relay magnet will be interrupted for the reasons stated. If, however, the block be clear the track magnet 33 is energized (as block B) and its armature is drawn up with the contacts 38, 40 engaged with the spring contacts 39 and 43, respectively, in which case the indicating device will display a "no danger" signal and the transient controlling circuit will be maintained closed while the contact wheels 26 and 29 are passing over the insulated rail sections. The insulated rail sections are located at such distance inside the far ends of the blocks as to insure that the contact wheels will pass off of the insulated rail sections before the front truck wheels pass upon the rails of the next block ahead and thereby prevent the train setting its controlling or signaling device or a local signal against itself. It will of course be understood that the transient train control or signal device may be operated either in conjunction with or independently of local signals, as semaphores at the junctions of blocks. If operated independently of local signals the signal circuits 35 will be omitted.

Arrangements whereby the controlling mechanism hereinbefore described may be operated in connection with a switch or turn out and thus avoid a train from being accidentally diverted into an open switch are illustrated in Fig. 2. As shown in said Fig. 2 the switch points are operated by a switch stand 52 of any preferred type located at the side of the track. At a suitable distance in advance of said switch are two insulated rail sections 45, 46 like those hereinbefore referred to. One of the said insulated rail sections is electrically connected with a contact point 54 on the switch stand, and the other insulated rail section is electrically connected with a switch arm 55. Said switch arm 55 is connected with a movable part of the switch stand in such manner that when the switch is closed to the main track the switch arm 55 will be in position for contact with the contact point 54, as indicated by dotted lines in Fig. 2, thus maintaining the insulated rail sections in circuit with the contact wheels 26, 29, as they pass over the insulated rail sections. When, however, the switch is thrown open the switch arm 55 will be moved out of contact with the point 54 and the loop circuit will be interrupted in the same manner as the loop circuit shown in Fig. 1 is interrupted when open at the contacts 43.

Various changes may be made in the transient operating circuit to adapt the parts thereof to various forms of controlling and signaling devices carried by the train and the invention is not limited to these or other structural details which have been illus-

trated, excepting as such details are herein-after made the subject of specific claims.

It will be evident to one skilled in the art that instead of the two oppositely located insulated rail sections at the junction of the two blocks, there may be employed a single insulated rail section, but the provision of two such rail sections increases the durability of the apparatus and avoids liability of improper operation in case of impaired insulation of one of the rail sections. I may employ a signal device, such as a lamp 60, which is connected in the motor circuit, as shown in Fig. 1, and which will be operated when the circuit is closed.

I claim as my invention:—

1. An electric control system for railway trains comprising, in combination, a controlling apparatus carried on the locomotive, an electro-magnet carried by the locomotive adapted when energized to render said apparatus inoperative, a normally closed controlling circuit for said electro-magnet including an energizing battery carried by the locomotive, and contact devices arranged between the front and rear wheels of the locomotive in engagement with the track rails, the contact device at one side being insulated from the contact device at the other side, and said contact devices being adapted to complete the electro-magnet circuit through the track rails and the locomotive wheels, and short insulated sections in the track rails over which the contact devices travel, the said insulated rail sections being normally connected so as to complete the circuit through the controlling apparatus when the contacts travel thereover, and means arranged to interrupt the connection between said insulated sections and thereby open the last named circuit.

2. An electric control system for railway trains comprising, in combination, a railway track divided into blocks, each equipped with a track circuit including a track relay, a controlling apparatus carried on the locomotive, an electro-magnet adapted when energized to render said controlling apparatus inoperative, a normally closed controlling circuit for said electro-magnet including a battery carried by the locomotive, and contacts adapted to travel on the two track rails, said contacts being adapted to close the electro-magnet circuit through said track rails and the locomotive wheels, insulated rail sections included in the track rails of each block and located a distance inside the far end of said block, said insulated rail sections being included in a normally closed partial local circuit, and means operated by conditions of danger in a block ahead to interrupt the partial circuit of the next block in rear.

3. An electric control system for railway trains comprising, in combination, a railway

track divided into blocks, each equipped with a track circuit including a track relay, controlling apparatus carried by the locomotive, an electro-magnet adapted when energized to render said controlling apparatus inoperative, a normally closed transient controlling circuit for said electro-magnet including a battery carried by the locomotive and contacts adapted to travel on the two track rails, said contacts being adapted to close the electro-magnet circuit through the track rails and the locomotive wheels, insulated rail sections included in the track rails of each block and located a distance inside the far end of the block, conductors extending around said sections to maintain electric continuity of the track rails of each block in front and in rear of the insulated sections, said rail sections being normally connected to form a closed partial circuit, and means operated by conditions of danger in a block ahead to interrupt the said partial circuit of the next block in rear.

4. The combination with a track divided into insulated blocks, each of said blocks containing short, insulated rail sections located near the forward end thereof, of a normally closed track circuit for each block,

a relay in said track circuit, local partial circuits including said short insulated sections and having circuit openers normally closed by said track circuit relay, a controlling mechanism carried by the locomotive, a motor adapted to operate said mechanism, a battery for driving said motor, a switch adapted to connect said battery with said motor, an electro-magnet adapted when energized to hold said switch open, a normally closed circuit for said electro-magnet including a battery carried by the locomotive, and contacts engaging the track rails, said contacts being adapted to close said electro-magnet circuit through the track rails and the locomotive wheels and to open said circuit to operate said switch when said contacts engage the insulated sections and local partial circuit including the short insulated rail sections is open.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 16th day of February A. D. 1909.

JAMES T. THOMPSON.

Witnesses:

G. J. BRYCE,

GEORGE R. WILKINS.