

(No Model.)

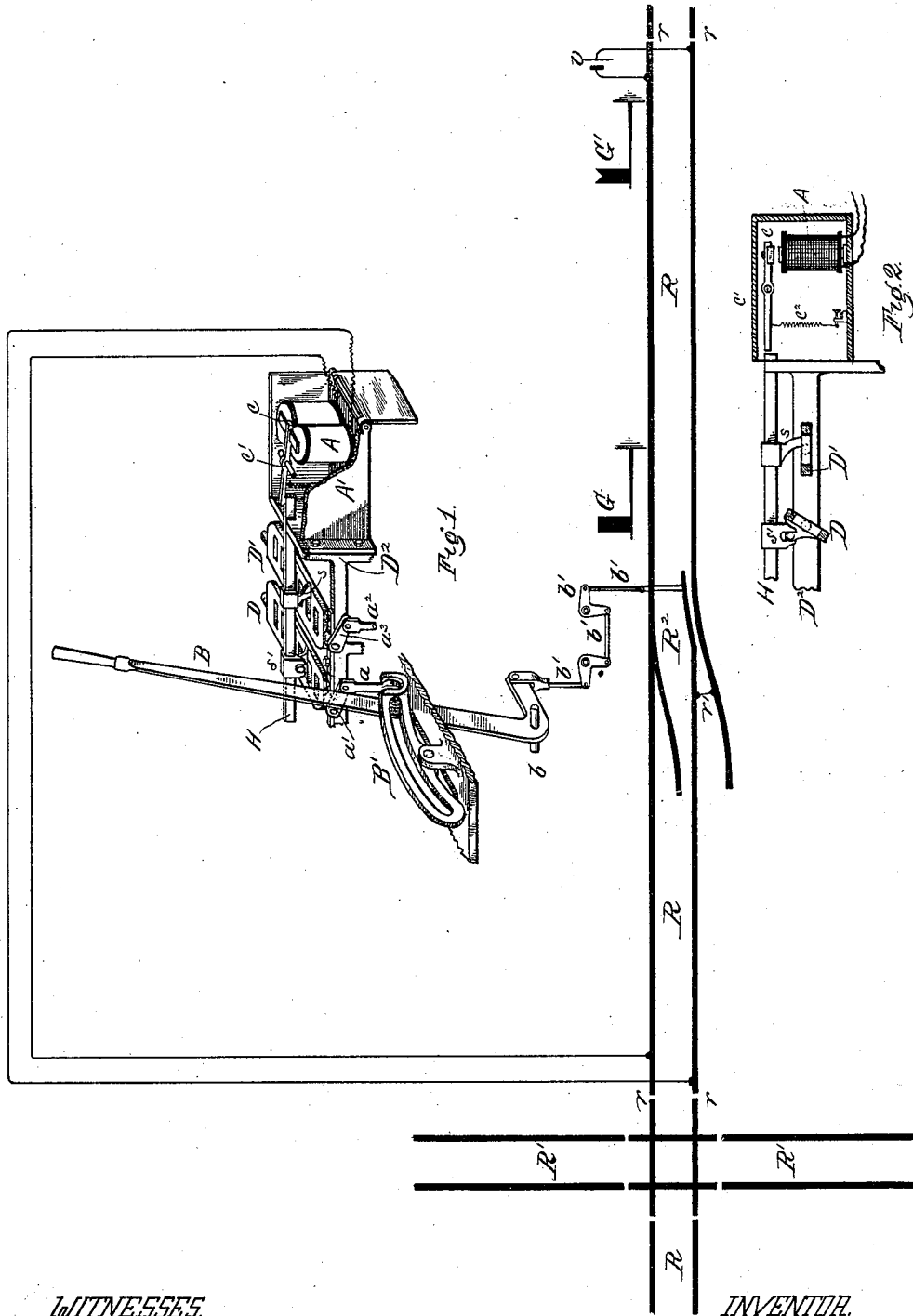
3 Sheets—Sheet 1.

C. H. JACKSON.

RAILWAY SWITCH AND SIGNAL MECHANISM.

No. 301,369.

Patented July 1, 1884.



WITNESSES.

R. A. Whittlesey  
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INVENTOR.

Caleb H. Jackson,  
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(No Model.)

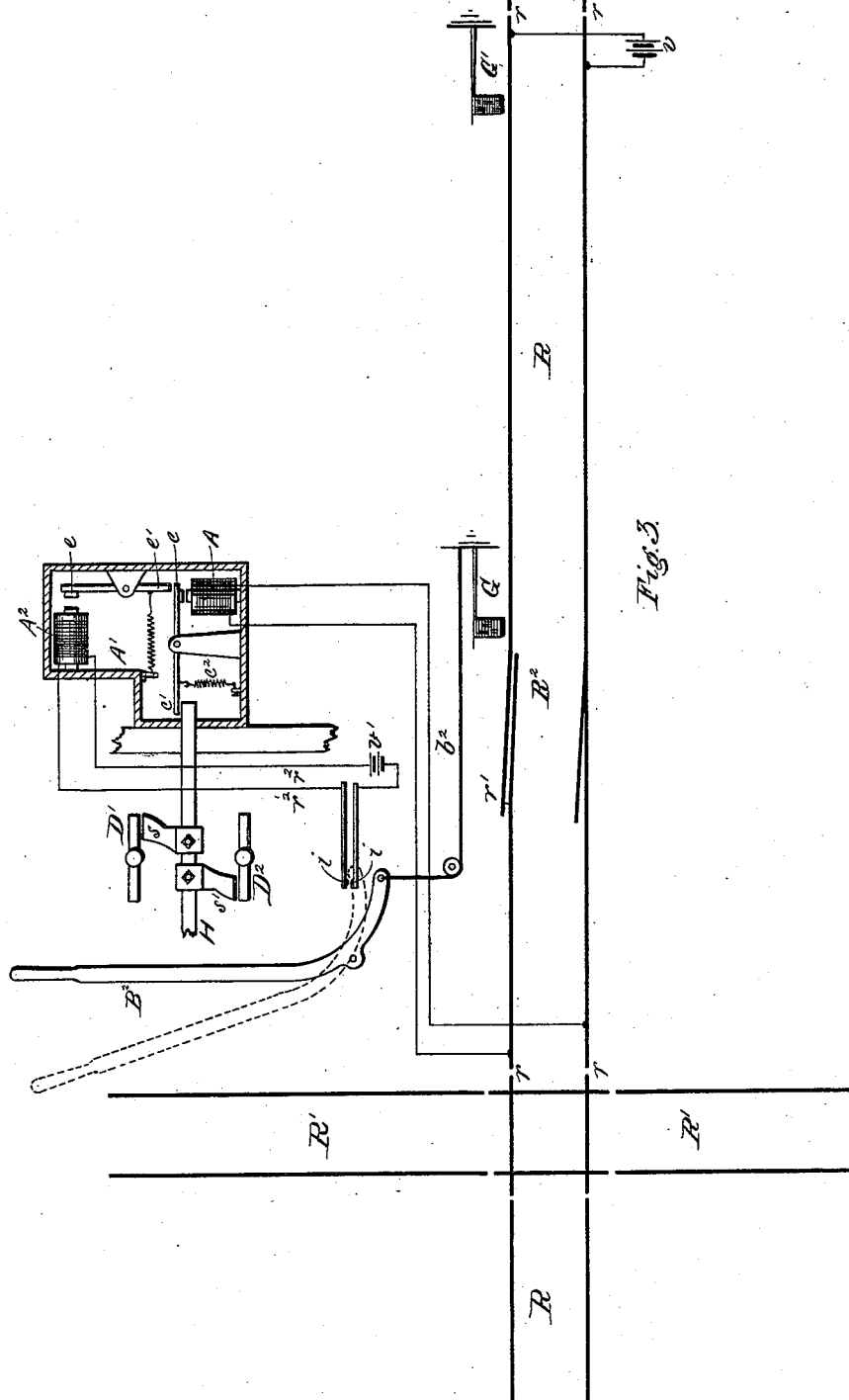
3 Sheets—Sheet 2.

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*R. A. Whittlesey*

Inventor

*C. H. Jackson.*  
*Atty. George H. Christy*

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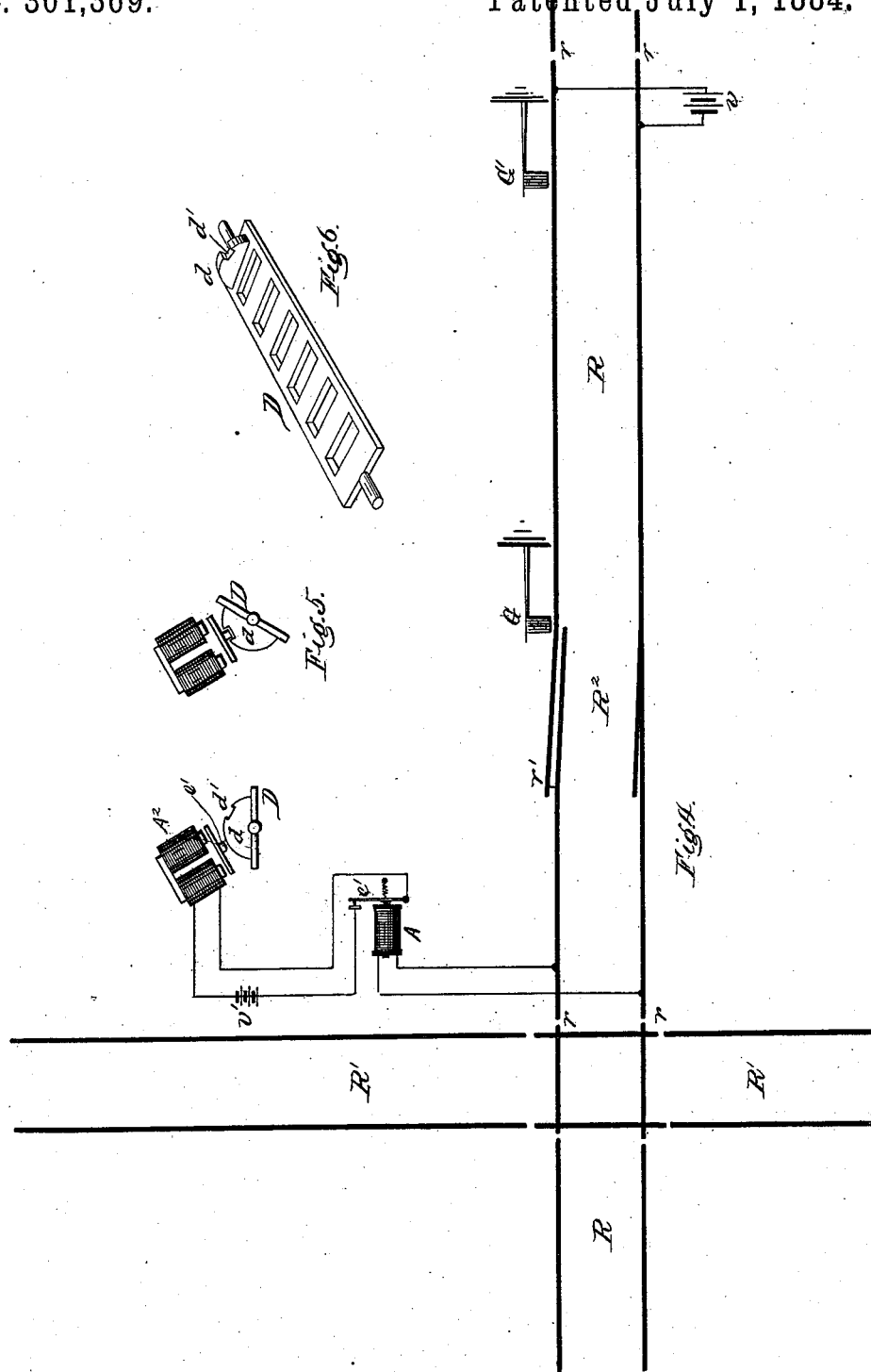
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# UNITED STATES PATENT OFFICE.

CALEB H. JACKSON, OF ALLEGHENY, PENNSYLVANIA.

## RAILWAY SWITCH AND SIGNAL MECHANISM.

SPECIFICATION forming part of Letters Patent No. 301,369, dated July 1, 1884.

Application filed June 20, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, CALEB H. JACKSON, a citizen of the United States, residing at Allegheny, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Railway Switch and Signal Mechanism; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a view in perspective of such parts and so much of an interlocking-machine as is necessary, in connection with a diagram of a railway-track, to illustrate my present invention in one form of its application. Fig. 2 is a detached sectional view of the locking and interlocking appliances of Fig. 1 in a position of locked and interlocked. Fig. 3, Sheet 2, shows the same invention in a somewhat modified form; and Figs. 4, 5, and 6, Sheet 3, show still further modifications or embodiments of the invention, as presently to be explained.

In Letters Patent No. 255,998, granted to me April 4, 1882, I made provision in the manner therein described for the locking of switch and signal levers by train action, and the operation was such that as soon as the train entered on the insulated track-circuit the electric locking was immediately performed, whether the lever to which the lock was applied was forward or back. It is sometimes desirable in mechanism of this class—that is, in connection with a switch and signal system embracing an interlocking-machine—that, while the switch is open or set to the siding or turn-out, or so as to derail, the signals corresponding thereto should be locked in the danger position, and also so that when the switch is set for “main line closed,” or with an unbroken track, the signal-shifting lever should be unlocked, and also so that the train on approaching will operate automatically an electrical locking mechanism, so as then to lock the switch-lever. In my preferred construction or combination of apparatus by which to secure these ends I apply the electrically-actuated lock to an interlocking member of the mechanical interlocking mechanism

in such manner that when such interlocking member is in one position it will not be subject to any electrical locking action, but so that when in another position it will be locked by electrical action as a result of train movement; and while I believe I am the first to construct or devise an apparatus adapted to attain these results, I also believe I am the first to combine an electric lock actuated by train movement with any movable interlocking member of an interlocking machine, and such combination I claim as a part of the present invention, independently of other features of construction and combination hereinafter described.

Referring first to Sheet 1, R R' may represent the tracks of a grade-crossing, and it will be sufficient, in illustration of the present invention, to describe it as combined with one of such tracks, since the appliance may be duplicated for the different lines of track as they approach the crossing; but all the interlocking appliances should be incorporated into one machine located in a single cabin or tower, as is usual in the art. In the track represented I make a throw-off or derailing switch, R<sup>2</sup>, which may be constructed to derail the train or to run it off onto a branch, siding, or turn-out; and in so far as relates to some portions of the present invention the mechanism and system of apparatus herein described may be applied to any switch in the line at any point. A portion of the track is to be insulated, as at r, such insulated section extending to, nearly to, or beyond the distant signal G', and this section of track, with rails electrically connected, is to be coupled with a battery, v, and an electro-magnet, A, by wire connection, in the manner common in the Robinson closed-circuit track system.

Any suitable interlocking-machine may be employed for the purpose in view, and for convenience of illustration I have shown that commonly known as the “Saxby & Farmer,” or so much of it as is necessary to illustrate the present invention. The hand-lever B is mounted in any suitable frame, pivoted, as at b, so as by the usual bell-crank and rod connection, b', to open and close the switch R<sup>2</sup>. Electrical connection past this switch may be made by any suitable wire, as at r'. The lever

B in its motion not only moves the switch, but also rotates the link B', and also, by the pitman *a* and crank *a'*, gives a short rotary motion to the spindle or flop D. By means of a similar hand-lever and connections therefrom to one or both of the home and distant signals G G', I provide for actuating such signals in the manner common in the art, and by a pitman, *a''*, and crank *a'''*, I provide for operating therefrom another Saxby & Farmer flop, D'.

At H, I have represented one of the longitudinally-moving bars of the Saxby & Farmer system and omitting the feature of preliminary locking. These devices, except as hereinafter described, have substantially the construction and operation of the corresponding devices shown and described in the Saxby patent, No. 230,200, dated July 20, 1880. The numbers of such flocs and horizontal bars and levers to actuate them may be indefinitely increased, and the interlocking appliances may be added in the manner well understood by those familiar with the Saxby & Farmer system. At *s*, I have shown one of the Farmer & Saxby dogs, and at *s'* one of the Saxby & Farmer connections between the bar H and the flop D; whereby the rotation of the flop will give to the bar H a motion in the direction of its length.

At the end of the frame-work D'', which carries the flocs and bars described, I arrange a box, A', which contains the electro-magnet A and its armature *c*. This armature is secured to a centrally-pivoted armature-lever, *c'*, and the opposite or free end of such armature-lever is so arranged relatively to the end of the horizontal bar H that when the electro-magnet A is excited and the free end of the armature-lever *c'* is thereby raised up it will stand clear of the end of the bar H, so that the bar can be moved to the right and come under the free end of the lever *c'*, as shown in Fig. 1, and thereby prevents such armature-lever from performing any locking function; but the arrangement is such that when the bar H is moved to the left it will pass out from beneath the free end of the armature-lever *c'*, and then the latter, being depressed by its retractile spring *c''*, will come into such position, as illustrated in Fig. 2, that, abutting against the end of H, or nearly so, it will lock said bar as against a return or rightwise motion, and then said bar will be locked as against a reverse motion, and, being locked, its flop D cannot be rotated back, and consequently the lever B cannot be moved or reversed. The position shown in Fig. 1 may be assumed as the normal position of the apparatus—that is, with the switch R<sup>2</sup> open and the signals G G' at "danger;" also, the circuit will be closed from the battery *v*, through the track-rails and the wires to the electro-magnet A, and the free end of the armature *c'*, being raised, will be held in that position, or, in other words, will be prevented from assuming or taking a locking position, by the engagement therewith, or beneath it, of the end of

the bar H. It will also be seen from the drawings that the switch-lever B is then unlocked, so that the switch R<sup>2</sup> may be closed or set for the main track. Still further, it will be seen that the dog *s*, by its bearing on the edge of the flop D', will lock the signal-lever, which, as above described, is connected therewith through the pitman *a'*. Assuming, now, that a train approaches from the right, it will of course be stopped by the distant signal G' at "danger." If the train runs onto the insulated section described, it is true that it will short-circuit the battery *v*, so as to demagnetize the electro-magnet A; but no locking effect will take place, for the reason that the armature-lever *c'* is locked out of action, as already set forth; and this is desirable for the reason that for many purposes I do not wish to lock the signal-lever, nor do I wish to lock the switch-lever when the switch R<sup>2</sup> is set for the siding, or in open position. If, however, the operator is ready for the train, he shifts the lever B, and in doing so closes the switch R<sup>2</sup>, and at the same time and thereby he rotates the flop D to the position shown in Fig. 2, and in doing so he moves the bar H to the left, so that its farther or right-hand end shall clear the free end of the armature-lever *c'* and allow it, under the influence of its retractile spring *c''*, to come down, as illustrated in Fig. 2, into line with said bar H, and thereby lock such bar as against a return or reverse motion; and this action of the armature-lever will take place if the train or any part thereof is on the insulated section of track, or as soon as it comes thereon. In this manner it will be seen that the switch-lever is locked when, and only when, the switch is set for main line, and that it cannot be locked at any other time; also, the same motion brings the dog *s* of the bar H over an open slot in the flop D', so that such flop is then unlocked, and consequently the lever connected therewith is free to be moved, so that the operator may clear one or both signals G G', with whichever one such lever may be connected, or both, if connected with both; but preferably a separate lever should be used for each, and both be unlocked by the movement of the lever B, so that both signals may be cleared, or so that after the train has passed the distant signal G', after it has been cleared, such signal G' may be reset at "danger," so as to protect the rear of the train, and allow the train to proceed under authority of the signal G when set at "safety."

In the arrangement last suggested the distant signal G' is used chiefly as a cautionary signal, when at "danger," and the engineer, after passing it at "danger," will keep his train under control until he sights the home-signal G. If he finds the latter at "danger," of course he will stop, but if at "safety" he will then know that the switch is locked in the position of "main track unbroken," so that he may then proceed with safety.

In Fig. 3, Sheet 2, I have shown the same

arrangement of tracks R R', switch R<sup>2</sup>, insulated section r r', and connecting-wire r'; also, battery v and wires to electro-magnet A, making a normally-closed track-circuit; also, the same armature, lever, and spring e e' e'', and a horizontal reciprocating bar, H, of an interlocking-machine. I have also shown by end view two flops, D' D'', and dogs s s', by which to lock and unlock the flops. I have not in this figure shown the levers by which to operate the bar H and flops D' D'', but they are such as are described with reference to Fig. 1, and the manner of applying and using them will be readily understood by those skilled in the art, understanding, however, that with the apparatus in normal condition the switch R<sup>2</sup> is open, both signals are locked at "danger," and the armature-lever e' is so engaged by the end of the bar H that when a train enters on the insulated track-section the electric locking of the switch-lever (with which the bar H is to be connected) cannot be effected; but when the bar H is moved to the left, in the operation of setting the switch R<sup>2</sup> to closed position, the dog s' will be moved clear of the flop D'', so that the signal-lever connected therewith will be unlocked, and with it its signal, and also the dog s will be moved into position opposite a slot in its flop D', so that the latter and its signal-lever and signal will also be unlocked. But the modification more particularly designed to be illustrated in this figure relates to the use of a relay by which still further to control the locking action. The signal-lever B<sup>2</sup>, from which, by suitable connection, B<sup>2</sup>, the home signal G is operated, is to be connected with one of the flops, as represented in Fig. 1, or in other suitable way, but I have shown it separate simply for convenience of illustration. Assuming it through its flop to be unlocked by the closing of the switch R<sup>2</sup> to main track, on being shifted to clear its signal G it works a circuit-closer of any suitable construction—say such as is represented—so as to bring its contact-points i i' together, and thereby close a circuit from the opposite poles of battery v' through wires r'' r'' and magnet A<sup>2</sup>. The latter is arranged so that through its armature e and armature-lever e' it may, as the circuit is closed or broken, unlock or lock the armature-lever e'; hence it will be seen that when the switch R<sup>2</sup> is set to the siding the switch-lever is unlocked, but both signals are locked at "danger;" that when the switch is set to main track both signals are unlocked; that if a train cautiously passes the distant signal at "danger" the switch is still unlocked, notwithstanding the short-circuiting of the electro-magnet A, because its armature-lever e' is locked out of locking engagement with the bar H by means of the armature-lever e', the electro-magnet of which is then in an open circuit, and that the electric locking of the switch-lever will be effected only when the home signal G is cleared, because then, and only then, will the circuit

through electro-magnet A<sup>2</sup> be closed, so as to cause the free end of its armature-lever e' to swing clear of the lever e'. As soon as this is done, the free end of the armature-lever e' will drop down into engagement with the bar H, and the switch-lever will be locked, as above explained.

In Figs. 4 and 5, Sheet 3, I have illustrated the same organization or system of apparatus as applied to the locking of the rotating flop instead of to the horizontally-sliding bar. In this figure I have shown only the flop D, or the one with which the switch-lever is to be connected. In this construction I make a curved segment, d, on the flop—say at or near one end, Fig. 6—and make a notch or recess, d', therein of suitable size and in such position that when the switch R<sup>2</sup> is set to open position the notch d' will be away from a position opposite to the armature-lever by which locking is done, as in Fig. 4; but when the switch is set to the main line the flop D shall by such motion be rotated to the position shown in Fig. 5, and its recess d' be brought into position opposite to the armature-lever referred to. Then the approaching train, on short-circuiting, as above described, will cause the armature-lever to enter the notch d', and so lock the switch-lever, and this armature-lever may be the armature-lever e' of the electro-magnet A of the track-circuit; or the latter may, as shown, be used as a relay to make and break a circuit through battery v' and electro-magnet A<sup>2</sup>, so that its armature-lever e' shall do the work described, in the manner already set forth.

As every interlocking mechanism consists of two movable parts or appliances, and as it is immaterial on which one of such appliances the electric lock is made operative, as long as one of such appliances interlocks with the other, it will be seen that it is immaterial whether the electric lock be made operative on the bar or on the flop, provided it be on that bar or on that flop with which the lever to be locked is mechanically connected at the time when the locking is to be done; nor do I limit myself to an apparatus employing a flop. Interlocking-machines having longitudinal and transverse locking-bars are well known, and the electric lock described may be applied to either or any of the bars of such a system, or to any of the movable interlocking appliances of other systems, without any substantial departure from the scope of the present invention, and the combination so made I believe to be, broadly, new with myself; and I also include herein the invention set forth as applied to the interlocking devices of a hydraulic, electric, or pneumatic or other power mechanism, and without limitation as to the lever, whether switch or signal, to be locked thereby; nor, as regards the changing of the electric conditions of the electro-magnet or magnets employed by, under, or as a result of train action, do I limit myself to the use of a

track-circuit, but include herein, as the mechanical equivalent thereof, any suitable track instrument adapted to do the work described, substantially in the manner set forth, and all such mechanisms are hereby and herein included under and indicated by the general term "track - circuit changer." Various other modifications may be made without any substantial departure from the scope of the present invention, and all such as include substantially the system and construction or combinations herein described, operating substantially in the manner set forth, are included herein; and it may be further stated that (referring to Fig. 1) the same results will follow if the lever B be the lever for operating a switch-locking bolt for the switch R<sup>2</sup>, or a draw-bridge locking-bolt, provided the organization be such that locking shall be effected when, and only when, the switch or draw-bridge is locked to make an unbroken main track.

I claim herein as my invention—

1. The combination, substantially as set forth, of an electrically-actuated lock, a movable interlocking member of the interlocking mechanism of a railway switch and signal interlocking-machine, an electric circuit connected with said lock, and a track-circuit changer actuated to render said circuit operative upon said lock by train movement upon a section of railway-track.

2. The combination, substantially as set forth, of an electrically-actuated lock, a mechanically-operated interlocking part or appliance of a hand-actuated interlocking-machine, an electric circuit connected with said lock, a track-circuit changer actuated to render said circuit operative upon said lock by train movement upon a section of railway-track, and a switch and one or more signals, each shifted by or from the levers of the interlocking-machine, these members being combined for joint operation, so that, with the switch open, the signals shall be interlocked, at "danger," and the switch-lever incapable of being electrically interlocked, and, with the switch closed, its lever shall be electrically locked under train movement, but without locking the signal lever or levers, substantially in the manner described.

3. In a railway-switch or draw-bridge and signal apparatus, the combination, substantially as set forth, of an electrically-actuated lock, a movable interlocking member of a hand-actuated switch or a bridge lock and signal interlocking mechanism, an electric circuit connected with said lock, a track-circuit changer actuated to render said circuit operative upon said lock by train movement upon a section of railway-track, a switch or

draw-bridge lock, and one or more signals, each shifted by or from the levers of the interlocking-machine, these members being combined for joint operation, so that when the switch or draw is open the signal or signals corresponding thereto will be mechanically locked at "danger," and the electric locking mechanism will be held out of action, and on the closing of the switch or draw or of their locking-bolts the signal or signals shall be unlocked, and the switch or bolt in position to be electrically locked by train movement, substantially in the manner described.

4. A system of apparatus in which are combined a lever or levers for governing track condition, a lever or levers for governing train movement, an interlocking mechanism controlling said levers, an electrically-actuated lock acting on a movable interlocking member of said mechanism, said lock being adapted to be locked out of action when the switch or bolt lever is in one position, and by its action to lock the interlocking member governing the movement of said lever when in its other position, an electric circuit connected with said lock, and a track-circuit changer actuated to render said circuit operative upon said lock by train movement upon a section of railway-track, substantially as set forth.

5. A system of apparatus in which are combined a lever or levers for governing track condition, a lever or levers for governing train movement, an interlocking mechanism controlling said levers, an electric lock adapted to be held out of locking engagement with an interlocking member of said mechanism governing the movement of a switch or bolt lever when said lever is in one position, and by its action to lock such lever when in its other position, leaving the signal lever or levers at the same time unlocked, an electric circuit connected with said lock, and a track-circuit changer actuated to render said circuit operative upon said lock by train movement upon a section of railway-track, substantially as set forth.

6. The combination of the bar H, armature-lever *c'*, magnet and circuit connections, and track-circuit changer, substantially as set forth.

7. The combination of the flops D D', bar H, armature-lever *c'*, magnet and circuit connections, and track-circuit changer, substantially as set forth.

In testimony whereof I have hereunto set my hand.

CALEB H. J. CKSON.

Witnesses:

GEORGE H. CHRISTY,  
R. H. WHITTLESEY.