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SWITCH CONTROLLING MECHANISM.

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1,413,559. Patented Apr. 18, 1922.

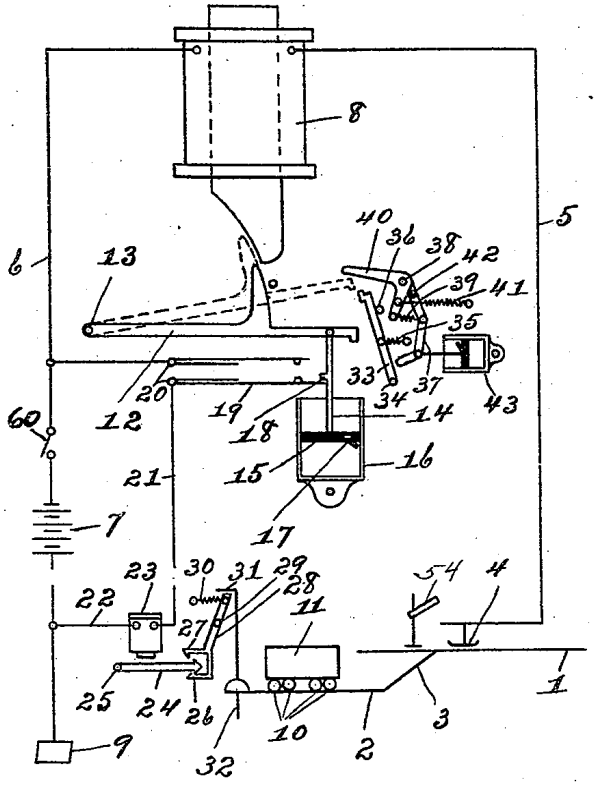

Fig. 1.

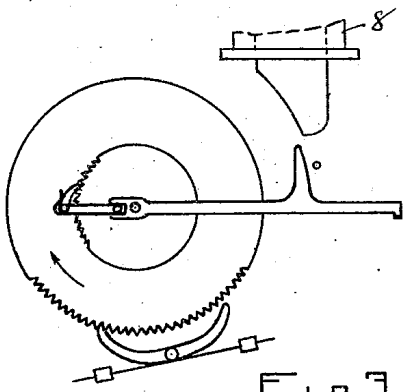

Fig. 3.

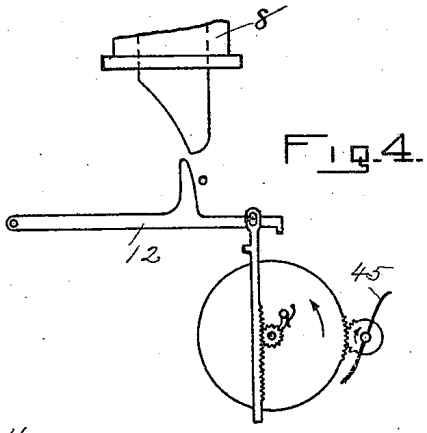

Fig. 4.

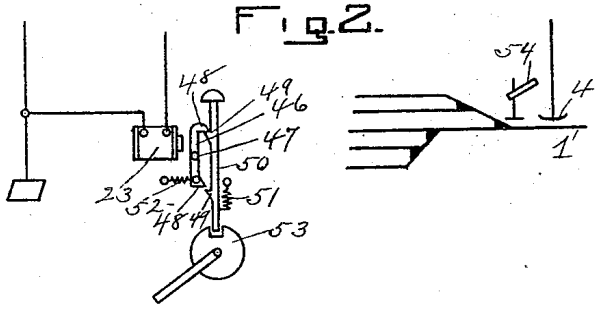

Fig. 2.

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SWITCH-CONTROLLING MECHANISM.

1,413,559. Specification of Letters Patent. Patented Apr. 18, 1922.

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To all whom it may concern:

Be it known that I, RUDOLF ZAUGG, a citizen of Switzerland, resident of Berne, Canton of Berne, Switzerland, have invented new and useful Improvements in Switch-Controlling Mechanism, of which the following is a specification.

Reference may be had to the accompanying drawings and the reference characters marked thereon, which form a part of this specification. Similar characters refer to similar parts in the several figures therein.

The principal object of the invention is to prevent the opening of a railway-switch over which a train is passing.

Other objects will appear in connection with the following description.

Fig. 1 of the drawings is a diagrammatic view of my improved switch-projecting mechanism shown in connection with a main track adjacent to a point where another track is connected therewith by a switch.

Fig. 2 is a similar view showing a modified form of switch-locking-and-releasing mechanism.

Figs. 3 and 4 are views in side elevation, more or less diagrammatic, illustrating different forms of mechanism which may be employed in place of the dash-pots shown in Fig. 1.

Referring to Fig. 1, a section of main track is shown at 1, and 2 is another section of track connected with the main track by a movable switch, 3.

Adjacent to the main track, 1, at a point near the junction of the switch, 3, therewith, I mount a circuit-closing member, 4, controlling an electric circuit including the wires, 5, 6, battery, 7, electromagnet, 8, and a ground-connection, 9.

I have shown no specific form of circuit-closing member, 4, as the same may be of any known form adapted to close the circuit when engaged by suitable members carried by or forming part of a train, (as the wheels, 10, of a car or train, 11,) and when thus engaged serves to close the circuit through said electromagnet, 8.

An armature, 12, for said electromagnet is in the form of a lever pivoted at 13, adapted to be attracted by the electromagnet, when energized, from the position shown in solid lines to that indicated by dotted lines in Fig. 1, said armature being automatically returnable by its own weight to the position shown by solid lines in said figure when said electromagnet is deenergized.

The armature, 12, is connected by a piston-rod, 14, with a piston, 15, of a dash-pot, 16, said piston being provided with a check-valve, 17, which automatically closes to resist the return movement of the armature, 12.

Upon the piston-rod, 14, is an offset, 18, which is adapted to engage the movable member, 19, of an electric switch, 20, which member, 19, is spring-actuated or in the form of a spring whereby said switch is automatically closed when released from control by the piston-rod-offset, 18, which offset tends to hold the switch open so long as the armature, 12, is in normal position.

The electric switch, 20, controls an electric circuit including wires, 21 and 22, and a second electromagnet, 23.

As shown in Fig. 1 this circuit is completed by a part of the wire, 6, and the battery, 7, forming part of the electric circuit which includes the electromagnet, 8.

However, the electric circuit including the switch, 20, and electromagnet, 23, may be a separate circuit with a separate battery if desired.

The armature, 24, for the electromagnet, 23, is in the form of a lever pivoted at 25, the swinging end of which lever forms an arrowheaded dog, the two jaws formed by the barbs of the arrowhead being alternatively engageable with two hooks, 26 and 27, on a lever, 28, fulcrumed at 29, and actuated in one direction by a coil-spring, 30, when released by said dog.

The hooks, 26 and 27, are so located as to be released from the arrowheaded dog, first the hook, 26, by a movement of the armature, 24, toward the magnet, 23, and then the hook, 27, by the return movement of the armature, 24, when the magnet, 23, is subsequently deenergized.

In its dog-engaged position, the lever, 28, extends beneath an offset, 31, on a switch-controlling member, 32, preventing downward movement of said member, 32, until the lever, 28, has been withdrawn from beneath the offset, 21, by the action of the spring, 30, after both hooks, 26 and 27, have been released from the arrowheaded dog.

The member, 32, may be any known form of locking device for the switch, 3, whereby

the switch, 3, cannot be opened until said member, 32, has been depressed or moved downward from the position shown in Fig. 1.

The operation of the mechanism thus far described is as follows.

The signal towerman or switch operator upon being advised that a train is to be moved from the track, 2, over the switch, 3, to the main line, 1, closes the switch, 3, or ascertains that it is closed, and then locks the switch by raising the member, 32, and forcing the lever, 28, beneath the offset, 31, on said member, 32, thereby engaging the arrowheaded dog with the hook, 26 on said lever, 28.

Thereafter the switch, 3, cannot be opened without downward movement of the member, 32, which downward movement is not permitted until both hooks, 26 and 27, are released from control of the arrowheaded dog at the end of armature, 24.

As the train moves over the switch, 3, onto the main track, 1, the first wheel of the train engages the circuit-closing member, 4, closing the circuit through the electromagnet, 8, causing the same to be energized and thus to attract the armature, 12, and move the same from the position shown by solid lines to that indicated by dotted lines in Fig. 1.

This movement is accompanied by an upward movement of the piston-rod, 14, which is freely permitted by the check-valve, 17, and which upward movement releases the spring member, 19, of the switch, 20, permitting said switch to automatically close, thus completing the circuit through the electromagnet, 23. The electromagnet, 23, being thus energized attracts the armature, 24, causing the arrowheaded dog on the end of said armature to be released from the hook, 26, and interlocked with the hook, 27, of the lever, 28, said lever remaining in position to prevent release of the switch-locking member, 32.

The electromagnet, 23, remains thus energized so long as the switch, 20, remains closed, and the switch, 20, remains closed until forcibly opened by the projection, 18, upon the return of the armature, 12, to normal position.

As above explained the return movement of the armature, 12, is delayed or retarded by the automatically closed check-valve, 17, of the dash-pot, 16, so that the return movement of the armature, 12, consumes an interval of time which may be predetermined by limiting the leakage through said check-valve and around said piston, 15.

If the circuit-closing member, 4, is actuated by a single element only of a train or car the switch, 20, will be opened upon the expiration of the predetermined interval of time for which the dash-pot, 16, is adapted, and upon the opening of the switch, 20, the electromagnet, 23, being de-energized, the armature, 24, is released and falls by gravity out of interlocking engagement with the hook, 27, thereby releasing the lever, 28, to the action of the spring, 30, which withdraws the lever from beneath the offset, 31, thereby releasing the switch-locking member, 32.

The mechanism may thus be adapted to prevent release of the switch-locking member, 32, for any desired interval of time after the circuit-closing member, 4, has been actuated.

While I am thus able by a single operation of the circuit-closing member, 4, by a car or train passing from the switch-track onto the main track, to delay the release of the switch-locking member for a sufficiently long interval to protect said car or train, it will be apparent that if the mechanism were adjusted to so protect a train of maximum length it would delay the release of the switch for a long period after a single car, engine or short train had fully left the switch and passed onto the main track.

I therefore prefer to employ a plurality or series of members on the train to successively engage the circuit-closing member, 4, and I preferably employ the wheels of the cars for this purpose.

In thus employing the wheels or similar successive members for actuating the circuit-closing member, 4, the dash-pot, 16, can be adjusted to delay the opening of the electric-switch, 20, with respect to the interval of time between successive engagements of the wheels with the circuit-closing member, 4, when the train is traveling at normal speed, by which I mean any approved speed at which the train is moved from the switch-track on to the main track.

When the dash-pot, 16, is thus adjusted, after the circuit-closing member, 4, has been actuated by the first wheel of the train, and the armature, 12, has been attracted by the energized electromagnet, 8, to close the electric switch, 20, and said first wheel has left the circuit-closing member, 4, before the armature, 12, in its delayed return movement, can open the electric switch, 20, the next wheel of the train will actuate the circuit-closing member, 4, again energizing the electromagnet, 8, and again withdrawing the armature, 12, fully from normal position; and this operation will be repeated as each successive wheel engages the circuit-closing member, 4, and after the last wheel of the train has left the circuit-closing member, 4, the return of the armature, 12, to normal position will be retarded or delayed for whatever period of time the dash-pot, 16, is adjusted.

If for any reason the train should stop with one of the wheels in engagement with and actuating the circuit-closing member, 4, the electromagnet, 8, will remain ener-

gized during such engagement thus holding the armature, 12, in the attracted position and thereby maintaining the switch-controlling member, 32, in locked position.

Should a train stop while partly on the main track and partly on the switch track with none of its wheels in engagement with the circuit-closing member, 4, the armature, 12, would after the predetermined interval of time for which the dash-pot, 16, is adjusted, return to normal position to open the electric switch, 20, unless means were provided for preventing such delayed return movement.

For this reason I employ a dog, 33, in the form of a lever fulcrumed at 34, yieldingly held by a coil-spring, 35, against a stop, 36, and movably away from said stop to a position in the path of the armature, 12.

The neighboring ends of the armature lever, 12, and the dog, 33, have interlocking members adapted to be engaged by the return movement of the armature, 12, when the dog, 33, is held in the return path of the armature; and after being thus interlocked the dog, 33, will support the armature against further return movement and cannot be disengaged therefrom until the armature is again raised as by energization of the electromagnet, 8.

The dog, 33, is at certain times moved into the path of the amature, 12, by engagement with the dog of a lever, 37, fulcrumed at 38, which lever is connected by a coil-spring, 39, with one arm of an angle-lever, 40, fulcrumed at 38, the other arm of which angle-lever overhangs the end of the armature lever, 12, in position to be engaged and moved thereby.

Return movement of the angle-lever, 40, is induced by a coil-spring, 41, which spring also induces return movement of the lever, 37, by engagement of the angle-lever, 40, with a stop, 42, on said lever, 37.

Movement of the lever, 37, toward the dog, 33, is retarded for a predetermined interval of time through the medium of a dash-pot, 43, similar to the dash-pot, 16.

The operation of this part of the mechanism is as follows:

So long as the train is travelling at normal speed each wheel is in engagement with the circuit-closing member, 4, for only a very brief interval of time.

As the armature, 12, is successively attracted by the electromagnet, 8, as the successive wheels engage the circuit-closing member, 4, the angle-lever, 40, is successively actuated by engagement of the attracted armature, 12, therewith, these movements of the lever, 40, tending through the spring, 39, to move the lever, 37, against the dog, 33, but this movement is retarded by the dash-pot, 43, so that the dog, 33, is not actuated in the brief interval during which the electromagnet, 8, is energized by any single engagement of a wheel with the circuit-closing member, 4, when the train is travelling at ordinary speed.

Thus, at ordinary speed each impulse to actuate the dog, 33, ceases before it becomes effective to actuate the dog, and the dog remains ineffective.

In stopping the train however it is necessary to gradually reduce the speed of the train, and as its speed is reduced the period of time during which each successive wheel remains in engagement with the circuit-closing member, 4, is correspondingly lengthened and thereby the successive periods during which the armature, 12, is held attracted by the electromagnet, 8, are lengthened until as the train is about to stop, the period during which the electromagnet, 8, remains energized by engagement of a wheel with said circuit-closing member, 4, becomes so great that the dash-pot, 43, cannot longer retard the action of the lever, 37, upon the dog, 33, whereupon said dog is forced into the return path of the armature, 12, and so remains until the electromagnet, 8, is de-energized.

When the electromagnet, 8, is next de-energized the lost motion afforded by the stretching of the spring, 39, permits the end of the armature lever, 12, to interlock with the neighboring end of the dog, 33, before the lever, 37, is released from the tension of the spring, 39.

After the armature, 12, and dog, 33, have thus been interlocked they remain so interlocked until the electromagnet, 8, is again energized whereupon the armature, 12, is by attraction of the electromagnet, 8, moved out of engagement with the dog, 33, which is immediately withdrawn against the stop, 36, by the coil-spring, 35.

Should the train thus stop with none of its wheels in contact with the circuit-closing member, 4, the return movement of the armature, 12, will be thus prevented by the dog, 33, maintaining the switch-controlling member, 32, in locked position.

I have used the term "dog" broadly as meaning any releasable holding device or detent which functions in substantially the manner in which the dogs above referred to function in the operation of my invention.

The dash-pots above described form very simple retarding devices; but any other form of retarding mechanism may be employed in place of the dash-pots, as, for example, an escapement mechanism, or a governor mechanism.

In Fig. 3 I have shown a simple form of escapement mechanism adapted for this purpose; while in Fig. 4 I have shown a simple form of governor mechanism for the same purpose. In the construction shown in Fig.

4, a rotary vane, 45, determines the period of delay in the return movement of the armature, 12.

In Fig. 2 I have shown a dog, 46 in place of the dog, 28. The dog, 46, is pivoted intermediately of its ends, at 47, and has hook ends, 48, alternatively engageable with projections, 49, on the switch-controlling member, 50.

The switch-controlling member, 50, is automatically raised by the spring, 51.

The dog, 46, is actuated by the electromagnet, 23, and is automatically returned to releasing position by a spring, 52.

The switch-controlling member, 50, is shown in locking engagement with a switch-operating member, 53.

While I have shown and described my invention in its application to a railway-switch, I wish it understood that it is also applicable to any movable member which it is desired to control by the passage of a train or car.

For example, the invention could be employed for the locking or interlocking of signal levers or the like, such a signal lever being diagrammatically shown at 54.

I have shown the circuit including the battery, 7, controlled by a simple switch, 60, shown in Fig. 1, whereby the mechanism above described may be rendered operative by closing the switch, or inoperative by opening the switch as shown. This switch is under the control of the operator and may be of any known form.

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

1. In a mechanism of the class described and in combination, a controlling member; a dog for securing said controlling member in locked position; train-controlled means for moving said dog into locking position, said dog being automatically returnable to releasing position; and means for preventing the return of the dog to releasing position during a predetermined period of time.

2. In a mechanism of the class described and in combination, a controlling member; train-controlled circuit-closing mechanism; an electromagnet energized by the actuation of said circuit-closing mechanism; a dog for securing said controlling member in locked position, said dog being actuated by said electromagnet when energized and being automatically returnable to releasing position; and means for maintaining the circuit including said electromagnet closed for a predetermined period independently of said train-controlled circuit-closing mechanism.

3. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; a dog for securing said switch-controlling member in locked position; train-actuated means in the path of a train passing over said switch for moving said dog into locking position, said dog being automatically returnable to releasing position; and means for preventing the return of the dog to releasing position during a predetermined interval of time.

4. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; train-actuated circuit-closing mechanism in the path of a train passing over said switch; an electromagnet energized by the actuation of said circuit-closing mechanism; a dog for securing said switch-controlling member in locked position, said dog being controlled by said electromagnet when energized and being automatically returnable to releasing position; and means for maintaining the circuit including said electromagnet closed for a predetermined period independently of said train-actuated circuit-closing mechanism.

5. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; train-actuated circuit-closing mechanism in the path of a train passing over said switch; an electromagnet included in an electric circuit with said circuit-closing mechanism; an armature for said electromagnet; an automatically closing electric switch; means whereby said armature tends to open said electric switch when said electromagnet is deenergized; a second electromagnet included in an electric circuit controlled by said electric switch; an armature for said second electromagnet having a dog for securing said switch-controlling member in locked position, said dog being controlled by the armature of said second electromagnet when the latter is energized and being automatically returnable to releasing position.

6. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; train-actuated circuit-closing mechanism in the path of a train passing over said switch; an electromagnet included in an electric circuit with said circuit-closing mechanism; an armature for said electromagnet; an automatically closing electric switch; connections whereby said armature tends to open said electric switch when said electromagnet is deenergized; a dash-pot for retarding the return movement of said armature to normal position; a second electromagnet included in an electric circuit controlled by said electric switch; an armature for said second electromagnet having a dog for securing said switch-controlling member in locked position, said dog being controlled by the armature of said second electromagnet when the latter is energized, and being

automatically returnable to releasing position.

7. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-locking member automatically returnable to releasing position; a dog having two jaws, one automatically engageable with said member when the latter is moved to locking position, and the other engageable with said member, in alteration with said first jaw, when the dog is moved to disengage said first jaw; train-actuated means in the path of a train passing over said switch for moving said dog to disengage said first jaw and engage said second jaw, said dog being automatically returnable to releasing position; and means for preventing the return of the dog to releasing position during a predetermined interval of time.

8. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; train-actuated circuit-closing mechanism in the path of a train passing over said switch; an electromagnet included in an electric circuit with said circuit-closing mechanism; an armature for said electromagnet; an automatically closing electric switch; connections whereby said armature tends to open said switch when said electromagnet is deenergized; retarding mechanism whereby return movement of said armature to normal position is prevented for a predetermined interval of time after said electromagnet is deenergized; a lever yieldingly mounted in position to be engaged by said armature when attracted by said electromagnet; a dog movable into the return path of said armature and automatically removable from said path, said armature and dog having interengaging members; means including a spring whereby said dog is moved into the path of said armature by the armature-induced movement of said lever; retarding mechanism whereby the movement of said dog into the path of said armature is delayed for a predetermined interval of time; a second electromagnet included in an electric circuit controlled by said electric switch; an armature for said second electromagnet having a dog for securing said switch-controlling member in locked position, said dog being controlled by the armature of said second electromagnet when the latter is energized, and being automatically returnable to releasing position.

9. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; train-actuated circuit-closing mechanism in the path of a train passing over said switch; an electromagnet included in an electric circuit with said circuit-closing mechanism; an armature for said electromagnet; an automatically closing electric switch; connections whereby said armature tends to open said electric switch when said electromagnet is deenergized; retarding mechanism whereby return movement of said armature to normal position is delayed for a predetermined interval of time after said electromagnet is deenergized; a lever yieldingly mounted in position to be engaged by said armature when attracted by said electromagnet; a dog movable into the return path of said armature, and automatically removable from said path, said armature and dog having interengaging members; a dog-actuating member connected by a spring with said armature-engaged lever; and a dash-pot for retarding the dog-actuating movement of said dog-actuating lever.

10. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; a dog for securing said switch-controlling member in locked position; train-actuated means in the path of a train passing over said switch for moving said dog into locking position, said dog being automatically returnable to releasing position; means for preventing the dog from returning to releasing position during a predetermined interval of time; and a train movable along said tracks having a plurality of members successively engageable with said train-actuated means at intervals of time, when the train is travelling at normal speed, shorter than said predetermined interval of time during which the dog is prevented from returning to releasing position.

11. In a switch-protecting mechanism and in combination, switch-connected tracks; a switch-controlling member; train-actuated circuit-closing mechanism in the path of a train passing over said switch; an electromagnet energized by the actuation of said circuit-closing mechanism; a dog for securing said switch-controlling member in locked position, said dog being controlled by said electromagnet when energized and being automatically returnable to releasing position; means for maintaining the circuit including said electromagnet closed for a predetermined period independently of said train-actuated circuit-closing mechanism; and a train movable along said tracks and having a plurality of members successively engageable with said train-actuated circuit-closing mechanism at intervals of time, when the train is travelling at normal speed, shorter than said predetermined period during which the circuit including said electromagnet is maintained closed independently of said train-actuated circuit-closing mechanism.

In testimony whereof, I have hereunto set my hand this 14 day of September, 1920.

RUDOLF ZAUGG.