J. THOMAS.

LEVER CHECK FOR ELECTRIC CONTROLLERS.

APPLICATION FILED AUG. 14, 1909.

958,564.

Patented May 17, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

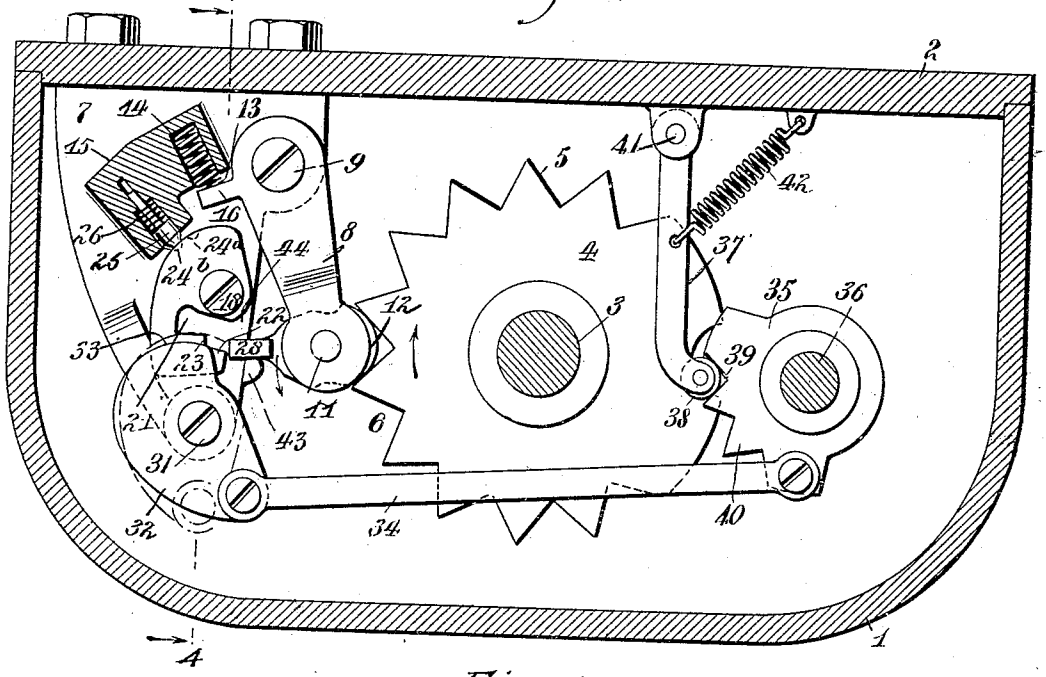
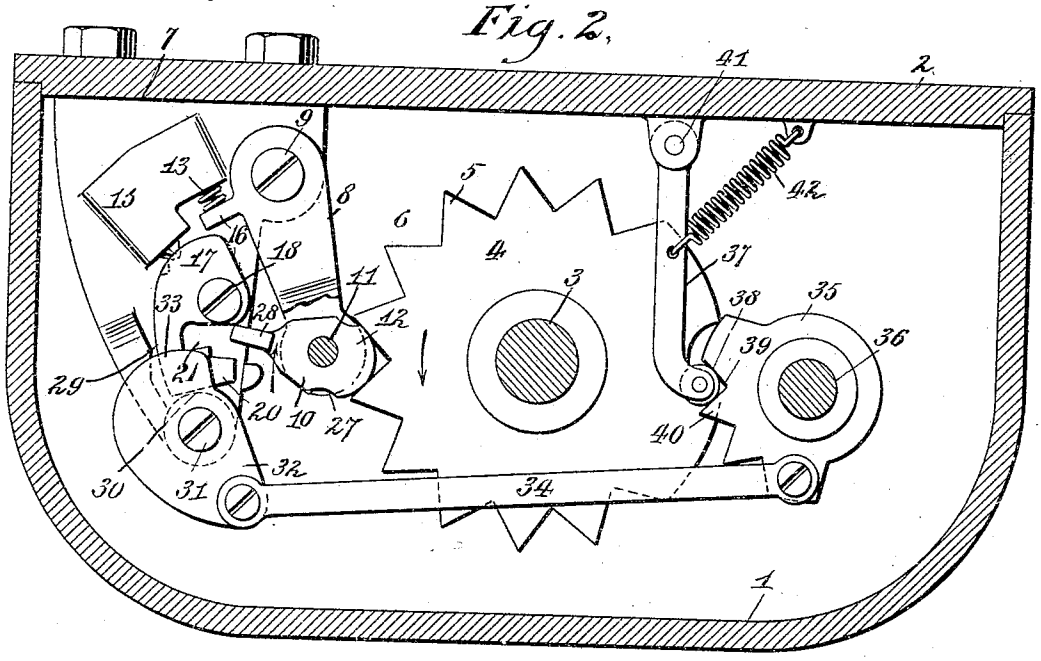


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

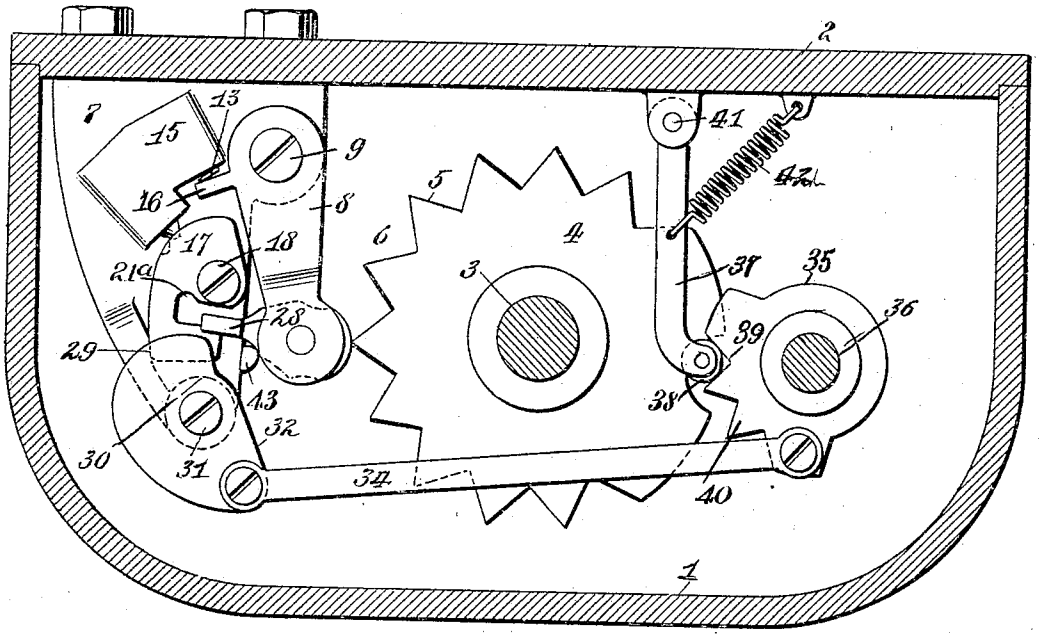


Fig. 4.

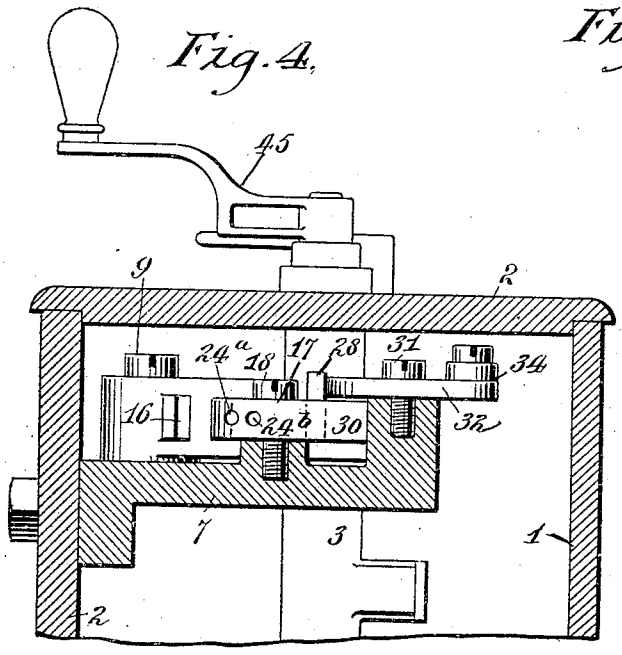
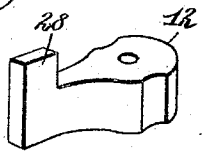


Fig. 5.



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UNITED STATES PATENT OFFICE.

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LEVER-CHECK FOR ELECTRIC CONTROLLERS.

958,564. Specification of Letters Patent. Patented May 17, 1910.

Application filed August 14, 1909. Serial No. 512,886.

To all whom it may concern:

Be it known that I, JOHN THOMAS, a subject of the King of Great Britain, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Lever-Check for Electric Controllers, of which the following is a full, clear, and exact description.

This invention relates to a lever check device to be used as an attachment for controllers such as are mounted on electric cars for controlling the operation of the motors.

The invention constitutes an improvement of the invention for which I secured a United States Patent No. 919,089, granted April 20, 1909. In its construction the device patented to me comprises a pawl arm which carries a pawl, and the butt end of this pawl is provided with a roller which engages the notches between the teeth of a segment carried by the lever spindle. The rotation of the spindle and segment produces certain changes in position of this pawl and other members coöperating with the pawl, in such a way that it is impossible for the controller lever to be given a continuous advancing movement which will throw the full strength of the current through the motor at once. In other words, the device operates as a check to prevent the lever from being swung in one movement to the full-current position.

An object of the present invention is to improve the construction of the pawl referred to above, so as to render it more efficient in operation.

A further object of the invention is to improve the means for resiliently constraining the pawl arm toward the segment, and to improve the construction of the device in other details.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a horizontal section taken through the upper part of a controller, certain parts being shown in elevation and illustrating the device in the position in which the pawl locks the segment and controller lever against rotation; Fig. 2 is a view similar to Fig. 1, but showing the position of the pawl when the lever is being unlocked or released for a further advancement or rotation in a forward direction; Fig. 3 is a view similar to Fig. 2, but showing the pawl in the releasing position in which it permits the free rotation of the segment and lever spindle; Fig. 4 is a vertical section through the upper part of the controller box, taken substantially on the line 4—4 of Fig. 1; and Fig. 5 is a perspective of the pawl which constitutes a feature of the invention.

Referring more particularly to the parts, and especially to Fig. 1, 1 represents the controller case or box which comprises the usual cover plate 2. Mounted in a vertical position in the controller box, the usual lever spindle 3 is provided, said spindle having a segment 4 of common form which is rigid therewith and which presents a plurality of equidistant radial teeth 5 presenting inclined faces so that V-shaped notches 6 are formed between the teeth, as indicated. At a suitable point on the interior of the case near the level of the segment 4, I attach a fixed bracket 7, and on the upper side of this bracket a pawl arm 8 is attached upon a pivot screw 9, as shown. On the outer end of this pawl arm, a pawl 10 is pivotally mounted on a suitable pivot pin 11. This pawl 10 has an enlarged butt 12 which projects toward the segment 4 and is normally held in one of the notches thereof by means of a spring 13, which spring is mounted in a spring pocket 14 formed in the lug 15 of the bracket 7. This spring 13 is simply a coil spring, the outer end of which extends from the pocket and thrusts against a wing 16 which projects nearly radially with respect to the pivot 9, being integral with the pawl arm, as shown.

Adjacent to the pawl in the upper face of the bracket 7, a rocker block or rocker 17 is pivotally mounted on a pivot screw 18. This block has substantially the form shown. It presents a jaw 20 which projects toward the extremity of the arm 8, and this jaw is separated from the body of the block by a deep slot or throat 21. The jaw 20 does not extend the full width of the block. The inner edge of the jaw which forms the edge of the slot, presents an inclined edge 22,

beyond which there is presented an abrupt shoulder 23, the purpose of which will be more fully described hereinafter. The edge of the block opposite to the spindle 3 is provided with two depressions or recesses 24ª and 24ᵇ, and the edge of the block at this point is rounded, as shown. A small plunger 25 is provided, having a rounded nose which is adapted to engage these depressions and this plunger is pressed toward the block by a coil spring 26, as indicated in Fig. 1. This plunger evidently will tend to hold the block in either of two positions when it is rocked from side to side by the pawl as will be described hereinafter.

Referring again to the pawl 10, its butt 12 presents a curved face, as shown, which face or edge may be struck upon a radius the center of which lies near the axis of the pivot 11, and on the sides of the pawl shallow recesses 27 are formed which are adapted to clear the ends of the teeth 5 when the segment is rotated. On the other end of the pawl, that is, on the small end which lies near the rocker 17, an upwardly projecting wing 28 is provided, the purpose of which will be described hereinafter. Behind the rear end of the jaw 20, an abutment 29 is provided on the bracket 7, and this abutment forms a back for the rocker to limit the rearward movement thereof, as will be readily understood. Adjacent to this abutment 29, a rounded boss 30 is formed which limits the forward swinging movement of the rocker in a similar manner, as indicated most clearly in Fig. 2. In this boss 30 a pivot screw 31 is provided for a cam 32, this cam presents an edge 33 which may be projected over the entrance to the slot 21, as indicated in dotted lines in Fig. 1. This cam 32 is connected by a link 34 with a star wheel or reversing segment 35 which is attached rigidly to the reversing spindle 36 at the opposite side of the controller case. Adjacent to the segment 35 a detent arm 37 is provided, having a roller 38 which is received in the notches 39 between the teeth 40 of the segment. This arm 37 is pivotally mounted at 41 on the inner side of the cover, and is constrained toward the segment by means of a coil spring 42, as shown.

In the positions of the spindle 36 and segment 35 shown in Figs. 1 to 2, the cam 32 is in a withdrawn position so that it does not obstruct the entrance to the slot in any way.

Referring again to the bracket 7, it will be seen that near the jaw 20 the bracket is provided with an upwardly projecting stop or lug 43 which limits the movement of the pawl when it is rotating in the direction of the arrow shown on the pawl in Fig. 1. The edge of the slot 21 which lies near the pivot screw 18 extends a considerable distance toward the pawl, so that it presents a cheek or shoulder 44 which is adapted to be struck by the end of the pawl so as to cause the rocker to be rotated, as will be described more fully hereinafter.

The mode of operation of the device will now be described, referring especially to Fig. 1: When the controller lever 45 is rotated from left to right, which is the usual direction of movement for turning the current on, it tends to rotate the spindle 3 in the direction of the arrow shown on the segment in Fig. 1. This direction of movement of the segment or star wheel 4 will tend to rotate the pawl 10 in the direction of the arrow shown adjacent to it, and it will swing the pawl until it strikes the stop 43 and in this position the end of the pawl will be substantially against the end of the jaw 20, so that the jaw 20 will prevent the pawl from being displaced outwardly. In this way the pawl locks the pawl arm against outward movement under the action of the inclined teeth 5, and, hence, the further rotation of the spindle in a forward direction is prevented. In this connection it should be noted that in this relation of the parts the butt of the pawl is seated in one of the notches 6. In order to free the segment so that it can be rotated in the direction of the arrow shown in Fig. 1, that is, forwardly, it is necessary to rotate it slightly toward the opposite direction, that is, backward, as indicated by the arrow in Fig. 2. When this is done the free end of the pawl rotates in a right-hand direction, as indicated by the arrow in Fig. 2, and it moves across the mouth of the throat 21, striking against the cheek 44 of the rocker near the pivot pin 18. The pressure on the block or rocker at this point will rotate it in a left-hand direction on its pivot, so that the rocker will be thrown into the position in which it is shown in Fig. 2. The rocker will be stopped in this position by the boss 30. At this time the nose of the plunger 25 will have become removed from the recess 24ᵇ and will be engaged in the recess 24ª. This plunger tends to hold the rocker resiliently in this position. Now if the direction of the lever be again changed so that it is given a forward movement, the end of the pawl will slide out into the throat or slot 21, but as it does so it will rotate across the throat so as to come against the edge 22 of the jaw. A continued movement will then bring the end of the pawl against the shoulder 23, so that when the arm 8 and the pawl 13 have had their full outward movement, the pawl will have pushed the rocker 17 back to its normal position in which it is shown in Fig. 1. In making this latter movement the segment will be released through one notch or tooth space, that is, the next notch in the rear of the one then in engagement with the butt 12 will be advanced into engagement with the pawl. In

the inner end of the throat 21 a laterally disposed recess or pocket 21ª is formed, and this pocket is provided in order to produce clearance for the end of the pawl 10 in performing its necessary movements in the throat when the motion of the segment is reversed and when the mouth of the throat is obstructed by the cam.

With the construction described, it will be evident that the controller lever can be rotated so as to turn the current on, and the motion cannot be a continuous and sudden one as the advancing movement will be stopped at each of the notches of the segment, necessitating a short pause and a reversal of the direction of movement of the lever. The spring-pressed plunger 25 acts not only as a clamping device, tending to hold the block in either of its extreme positions, but it prevents the block from vibrating or being moved from this position by the rocking or vibration of the car.

The link 34 provides a connection between the cam 32 and the reversing spindle 36, so that when the reversing spindle is thrown to its reversing position, the edge of the cam 32 will be moved out over the inclined edge 22 and the shoulder 23; the controller lever 45 can then be instantly swung back to the off position of the current. When the controller lever is being swung back in this manner to turn off the current, the edge of the cam 32 simply guides the end of the pawl into the throat so that the pawl will reciprocate in and out in the throat without tending in any way to arrest the outward movement of the arm 8. In this way the reversing movement of the lever spindle 3 is not obstructed in any way. It should be understood that the cam edge 33 is adapted to come in contact with the wing 28 which projects up from the end of the pawl so as to give the guiding effect just described.

Constructing the pawl 10 in a single piece and in such a manner that the butt thereof is a rigid and integral part of the pawl, appears to be highly advantageous and increases the efficiency of the pawl. It seems to give a better effect than when a roller is used in contact with the teeth, probably for the reason that the friction developed between the tooth and the face of the butt of the pawl, tends instantly to rotate the pawl in the desired direction. When using a roller in the butt end of the pawl as described in my patented device referred to above, its frictional tendency to rotate the pawl simply rotates the roller on its pivot, and the change in direction of the pawl results simply from the change in position of the notch with which the roller is in engagement. By making the butt end of the pawl quite large and rounded as described, in a certain sense it enables the pawl to cooperate with the segment in much the same manner as when the pawl presents a roller at this point.

Attention is called to the fact that in the present invention the link 34 is attached directly to the segment or star wheel 35, which is a very simple arrangement of this part of the mechanism. Arranging the spring 13 in the manner described, for pressing the pawl arm toward the segment, is highly advantageous as it leaves the interior of the case quite unobstructed. Attention is also called to the fact that when the spring 13 is arranged as described, it simply exerts a tendency to rotation of the pawl arm, and it does not tend in any way to swing the pawl arm out of its plane of rotation.

Having thus described my invention, I claim as new and desire to secure by Letters Patent,—

1. In combination, a controller spindle, a segment carried thereby, a movable member coöperating with said segment, a pawl pivotally mounted on said movable member and having a rounded rigid butt end adapted to engage the notches of said segment, the body of said pawl projecting away from said segment, and means coöperating with said pawl to check the continued advancing movement of said segment and adapted to be released by a periodical reversing movement of said segment.

2. In combination, a controller spindle, a segment carried thereby, an arm coöperating with said segment, a pawl carried by said arm, projecting away from said segment and having a rigid butt end engaging the edge of said segment, and a member normally adapted to obstruct said pawl when said arm is moved outwardly by said segment and having a slot which may receive said pawl.

3. In combination, a controlled spindle, a segment carried thereby having teeth, an arm pressed toward said segment, a pawl mounted on said arm and having a butt rigid therewith for engaging said segment, said pawl projecting away from said segment and being adapted to be swung by the teeth of said segment when said segment is rotated, and a movable member controlled by said pawl, adapted to check the forward rotation of said segment and adapted to permit a backward rotation of said segment.

4. In combination, a controller spindle, a toothed segment carried thereby, an arm pressed toward said segment, a pawl carried pivotally by said arm and having an enlarged rounded butt end rigid therewith and normally received in a notch of said segment between the teeth thereof, said pawl projecting away from said segment, and a movable block controlled by said pawl and having a throat adapted to receive said pawl when permitting the rotation of said segment, said block having a jaw adapted to

engage said pawl to arrest the movement thereof and check the rotation of said segment.

5. In combination, a controller spindle, a segment carried by said spindle, a pawl arm pivotally mounted near said segment and having a projecting wing, a spring thrusting against said projecting wing and adapted to press said pawl arm toward said segment, a pawl pivotally carried by said pawl arm and having a rigid rounded butt end adapted to engage the notches between the teeth of said segment, and a block coöperating with said pawl, normally tending to check the continued forward rotation of said segment and adapted to be released by a periodic backward rotation of said segment.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN THOMAS.

Witnesses:

F. D. CHUMEN,

PHILIP D. ROLLHAUS.