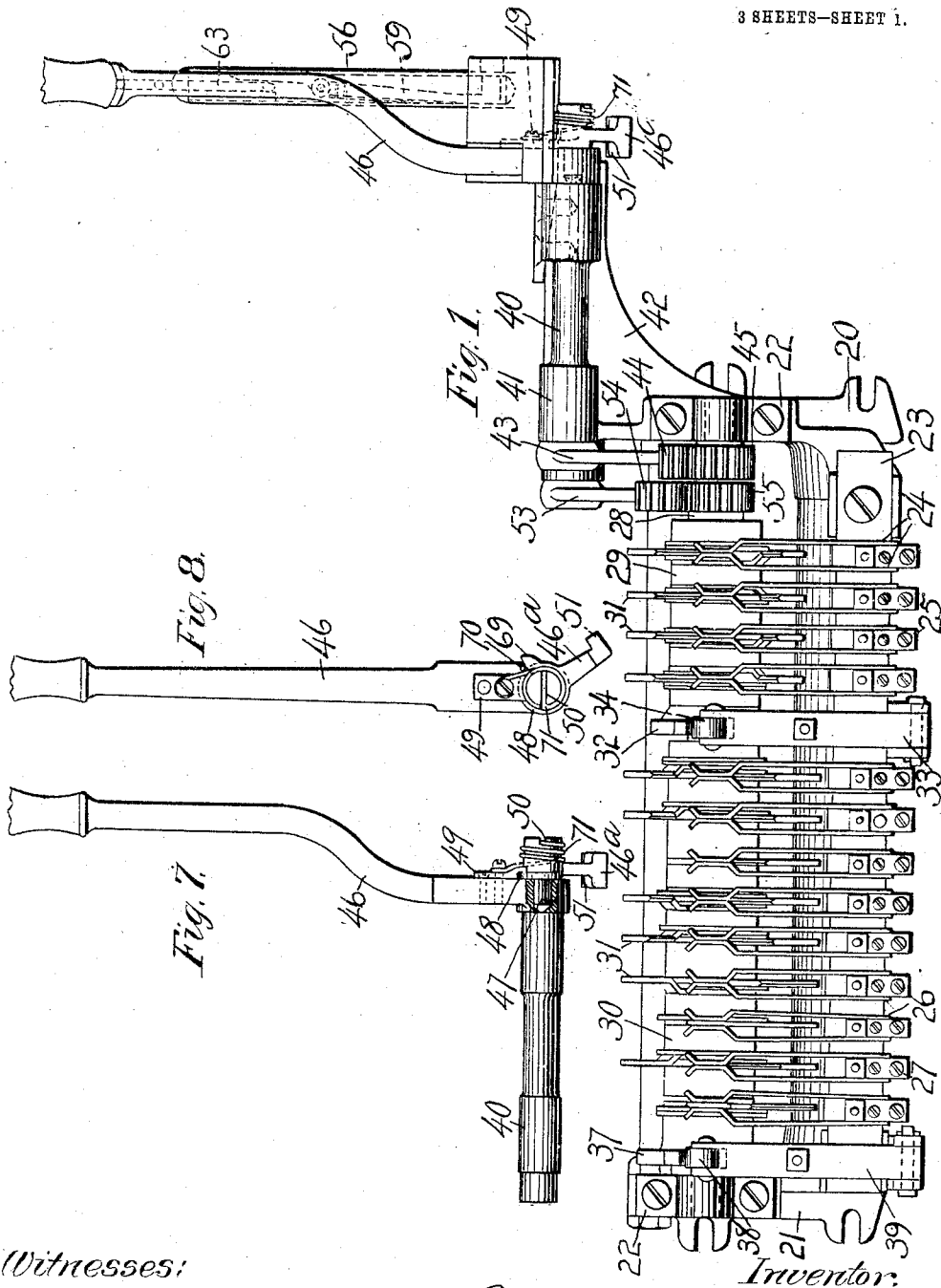


V. E. CHAMBERLIN.
 CONTROLLER FOR ELECTRIC MOTORS.
 APPLICATION FILED NOV. 23, 1908.

1,019,757.

Patented Mar. 12, 1912.

3 SHEETS—SHEET 1.



(Witnesses:
 J. H. Elliott
 L. S. Burkhardt

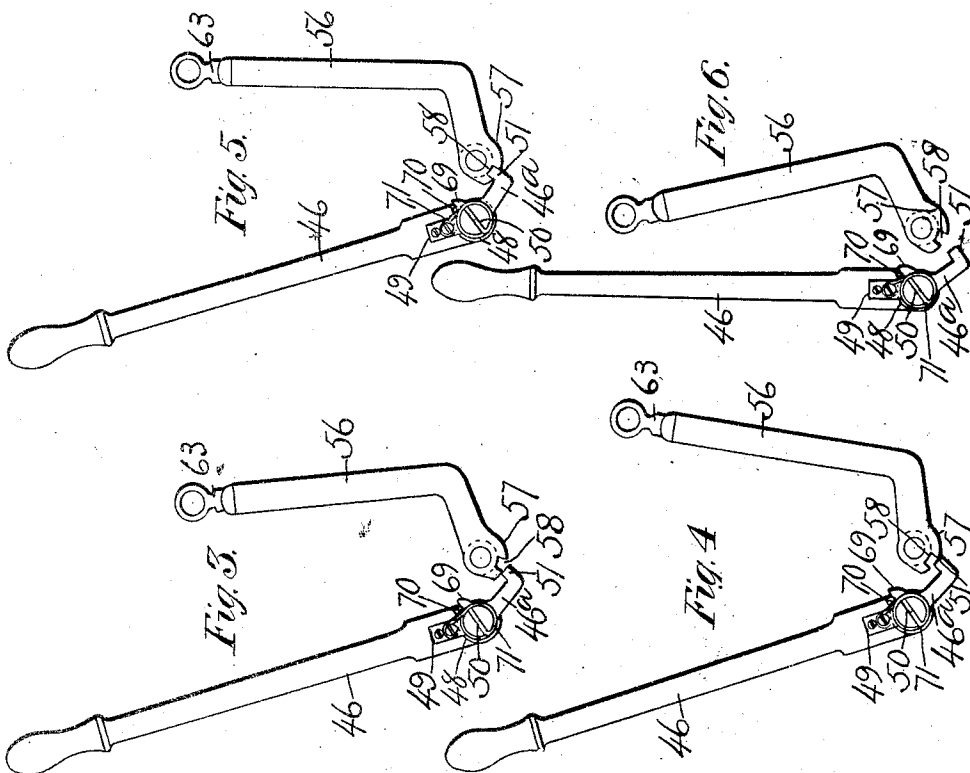
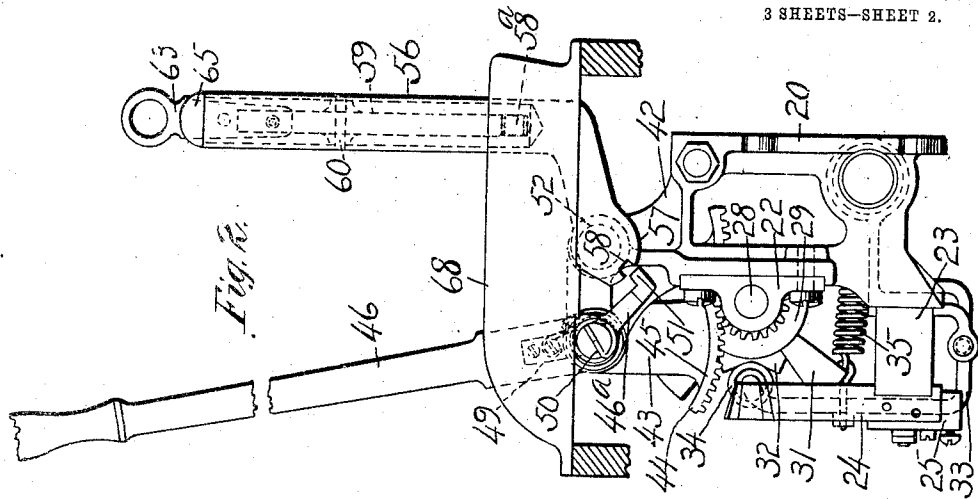
Inventor:
 Victor E. Chamberlin,
 by Arthur B. Jenkins,
 Attorney.

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3 SHEETS—SHEET 2.



Witnesses:

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 R. S. Berkortch.

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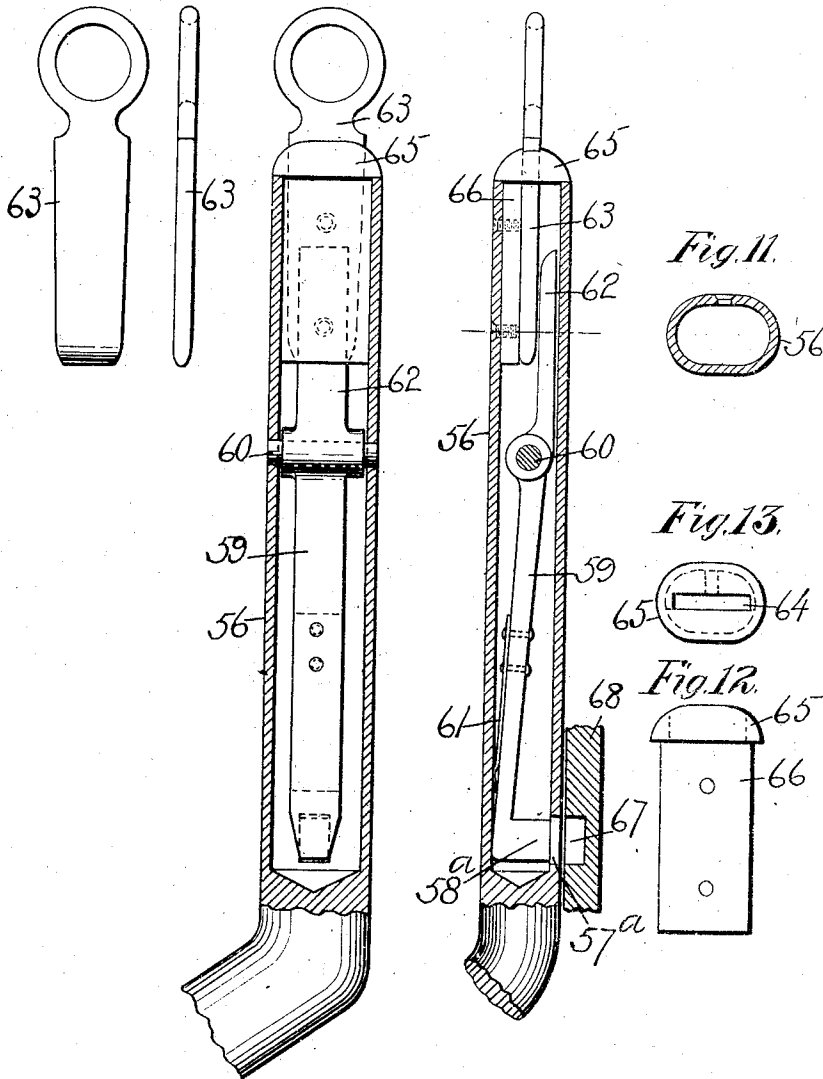
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3 SHEETS—SHEET 3.

Fig.15 Fig.14. Fig.9. Fig.10.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

VICTOR E. CHAMBERLIN, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE WAVERLEY COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION OF INDIANA.

CONTROLLER FOR ELECTRIC MOTORS.

1,019,757.

Specification of Letters Patent.

Patented Mar. 12, 1912.

Application filed November 23, 1908. Serial No. 464,022.

To all whom it may concern:

Be it known that I, VICTOR E. CHAMBERLIN, a citizen of the United States, and a resident of Indianapolis, in the county of Marion and State of Indiana, have invented a new Improvement in Controllers for Electric Motors, of which the following is a specification.

My invention relates to the class of devices for controlling the operation of electric motors, and more especially to those motors designed for propelling vehicles or the like, and the object of the invention is to simplify the construction and operation of the parts and at the same time increase the reliability, which object is accomplished by so constructing the regular operating parts of the apparatus that they may be utilized in temporarily rendering the apparatus inoperative, thus enabling the cutout switch to be dispensed with, and reducing the number of interrupted points in the circuit; and a further object of the invention is to reduce the liability to accident by reason of inadvertence or mistake in manipulating the parts, this being accomplished by so constructing the controller and reverse levers that the latter can be operated only with the former in predetermined positions; and a further object of the invention is to provide a construction that will allow the regular operating parts of the apparatus to be used as an emergency switch, thus further reducing the number of interrupted points in the circuit and simplifying the construction and operation, and a further object of the invention is to provide a device having generally numerous novel features of advantage and utility.

A form of device in the use of which these objects may be attained is illustrated in the accompanying drawings, in which—

Figure 1 is a view in front elevation of a controller embodying my invention. Fig. 2 is an end view of the same. Fig. 3 is a diagrammatic view showing the relative position of the controller and reverse levers, with the former in its first running position and the latter in the forward position. Fig. 4 is a like view but showing the reverse lever in the reverse position. Fig. 5 is a like view but showing the reverse lever in the neutral position. Fig. 6 is a similar view but showing the controller lever in position to operate the electric brake and

the reverse lever in the forward position. Fig. 7 is a detail view in front elevation of the controller lever and attached parts, the former being broken away to show construction. Fig. 8 is a detail end view of the same. Fig. 9 is a detail view on enlarged scale in lengthwise section through a portion of the reverse lever. Fig. 10 is a like view in a plane at right-angles to the plane of view of Fig. 9. Fig. 11 is a view in cross-section through the reverse lever only. Fig. 12 is a detail view showing the construction of the cap for the reverse lever. Fig. 13 is a detail end view of said cap. Figs. 14 and 15 are detail views showing the construction of the key. All of the latter mentioned figures from 11 on are on enlarged scale.

In the accompanying drawings the numerals 20 and 21 indicate brackets constructed for attachment to any suitable part of the vehicle, preferably in such position that the parts mounted thereon may be conveniently operated from the seat. A bar 23 is secured to the brackets 20 and 21, and this bar bears stationary fingers or contacts 24 properly connected with terminals 25. These contacts and terminals, above described, are appurtenant to the reversing mechanism and there is another set common to the driving mechanism and consisting of the fingers 26 and terminals 27, the sets of fingers and contacts common to the reversing mechanism being located at the opposite end of the controller from those common to the driving mechanism, the general form and arrangement of these fingers and contacts being common and well known in the art.

Bearings 22 are secured to the brackets 20 and 21, and a cylinder shaft 28 is mounted in these bearings. This cylinder shaft supports a reverse cylinder 29 loosely mounted thereon and a controller cylinder 30 secured thereto, the construction and operation of which will be well understood. Each cylinder bears contacts or blades 31 co-operating with the stationary contacts 24 and 26. A star wheel 32 is secured to the reversing cylinder 29, and a pivotally mounted lever 33 has at its upper end a roller 34 engaging within the notches between the points of the star wheel to locate the latter in certain positions. A spring 35 holds the lever in position with the roller in yielding engagement with the star wheel.

A similar star wheel 37 is mounted on the frame appurtenant to the controller cylinder 30, this latter having a roller 38 mounted on a lever 39, all constructed as described with regard to the lever 33.

A controller lever shaft 40 is mounted in bearings 41 on a projection 42 from the bracket 20. A sector arm 43 bearing a toothed sector 44 is secured to one end of the shaft, this sector meshing with teeth on a pinion 45 secured to the shaft 28. A controller lever 46 is secured at the opposite end of the shaft 40 and serves as a means, through the connected parts described, of rotating the controller cylinder 30. A pawl 46^a is pivotally mounted in the end of the shaft 40, as by means of a stud 47 projecting from the pawl into an opening in the shaft. This pawl bears a shoulder 48 against which a plate 49 secured to the lever 46 rests, this plate engaging the shoulder sufficiently to hold the pawl in position but allow its free rotary movement. A spring 71 having one end engaging a slot 50 in the pawl and the other end secured to the lever, holds the pawl at one limit of its play. This pawl has a bolt or toe 51 projecting from its extremity. A reversing lever shaft 52 is also mounted in bearings on the projection 42 from the bracket 20, this shaft having a sector arm 53 bearing a geared sector 54 in mesh with a pinion 55 secured to the reversing cylinder 29. A reversing lever 56 is secured to the shaft 52 and serves as a means for rotating the same to control the direction of movement of the vehicle. A cam 57 is located on the end of the lever 56 and has a recess 58 adapted to receive the toe 51 of the pawl 46^a. The lever 56 is hollow for the greater part of its length, having an opening 57^a in one side to receive a bolt 58^a from a spring latch 59 pivoted at 60 within the lever. A spring 61 is employed to press normally upon the lever to force the bolt 58^a into the opening 57^a and into a recess 67 in the case 68 to lock said lever against movement. The upper end 62 of the lever projects in position to receive the pressure of a key 63 which may be projected into a slot 64 in the top of the lever. In the preferred form of construction a cap 65 having a guide 66 projecting within the lever is secured thereto, and this guide insures the projection of the key in position to properly engage the arm 62 of the lever. The recess 67 is shown as extending only partially through the case, but if desired may extend entirely through the case in instances where the case is so located that the outer surface adjacent to the opening is not accessible.

The pawl 46^a has a nose 69 to be engaged by a pin 70 on the controller lever 46, by means of which the toe 51 may be withdrawn from the recess 58, when the controller lever 46 is pulled back.

The case 33 is suitably mounted to receive the levers 46 and 56 which project there-through.

From this construction of parts it will be noted that when the levers 46 and 56 are relatively located in certain positions the reversing lever is locked against movement. This is for the purpose of insuring proper operation of the mechanism and to prevent any possibility of operating the reversing lever 56 when the controller lever is in such position that injury would result therefrom. The construction prevents any movement of the reversing lever to reverse the movement of the vehicle while the controller is at any one of the running positions.

By referring to Figs. 3, 4, 5, and 6 it will be noted that the spring 71 forces the pawl 46^a toward the cam 57 on the reversing lever 56. If the reversing lever be moved in a direction to reverse the operation of the motor, or to the right, as seen in Fig. 3, the bolt 51 will be forced into the recess 58, thus locking the reverse lever in the neutral position. As seen in this view, the controller lever is in position to operate the vehicle at the first speed and the nose 69 is out of engagement with the pin 70 which allows the pawl to engage the recess 58 when they are opposite each other. As seen in Fig. 4, the reverse lever is in the reverse position, and if it now be moved in a direction to reverse the operation of the motor, or to the left, the same result as above described will follow, as is shown in Fig. 5. As shown in Fig. 6, the controller lever is in the electric brake position and the pin 70 engaging the nose 69 has forced the pawl 46^a so that the bolt 51 can not engage the recess 58 and the reverse lever may be moved without restraint from the pawl 46^a, it being noted that the key 63 being in place the bolt 58^a exerts no influence on such movement. The same result would follow the placing of the controller lever in the "off" position.

In the operation of the parts it will be noted that by removing the key 63 at the top of the reverse lever and moving the latter to the neutral position it will be automatically locked by engagement of the bolt 58^a with the recess 67 in the case 68. When the reverse lever is in this position the circuit is broken at all of the contacts on the reversing cylinder, as shown in Fig. 1, and as effectively as in the case of the removal of a plug from the electrical circuit and the usual plug is thus dispensed with. The reverse lever cannot be moved to either the forward or reverse positions until the key 63 is again inserted, and it is thus necessary to insert this key before the vehicle can be started.

It will be noted that the reverse lever may be moved to the neutral position, the position

occupied as shown in Fig. 5, at any time whether the key be inserted or not, but if the controller lever is in any but the "off" or electric brake position the reverse lever, when the key is in place will be locked by engagement of the bolt 51 with the recess 58 immediately upon reaching the neutral position. This enables the reverse lever to be used as an emergency switch at any time in case the controller should become inoperative while on any one of the running positions, by moving the reverse lever to the neutral position, it will become locked at this point and thus break the circuit as above described. This obviates the use of an auxiliary emergency switch in the current carrying circuit and insures perfect contact while in operation.

I claim—

1. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever, operatively connected with the controller and reverse members respectively, and a connection between said levers including a lock operatively connected with one lever and movable independently thereof to engage a keeper on the other lever, to permit movement of the reverse lever to a neutral position with the controller lever in any running position and to lock the reverse lever when it reaches the neutral position.

2. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, connections between said levers including a lock operatively connected with one lever but movable independently thereof to engage a keeper on the other lever to permit movement of the reverse lever to the neutral point with the controller lever in any running position, but to lock the reverse lever when it reaches the neutral point, and means operated by the controller lever to release said lock when the controller lever reaches the off position.

3. A controller including controller and reverse members having suitable electrical connections, a controller and a reverse lever operatively connected with the controller and reverse members respectively, and means operatively connected with one of said levers but movable independently thereof to engage a keeper on the other lever to lock the reverse cylinder in a neutral position only.

4. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, and means operatively connected with one lever but movable independently thereof to

automatically lock the reverse lever against movement in a predetermined position of the controller lever.

5. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a pawl operatively connected with one of said levers arranged to engage a recess upon the opposite lever, and means for operating said pawl to lock the reverse lever against movement in a predetermined position of the controller lever.

6. A controller including a controller and a reverse member having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a pawl operatively connected with one of said levers to engage a recess upon the opposite lever, and means for operating said pawl to lock the reverse lever against movement with the controller lever in a running position.

7. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, said reverse lever having a locking recess, a pawl operatively connected with the controller lever, and means for causing the pawl to engage said recess in a predetermined position of the controller lever.

8. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, and a spring actuated pawl operatively connected with one of said levers to engage a recess upon the opposite lever with said recess in a predetermined position of the controller lever.

9. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a pawl operatively connected with one of said levers to engage a recess upon the opposite lever, a nose upon said pawl, a shoulder upon the lever to engage the nose, said nose and shoulder being located to permit engagement of the pawl with said recess in a predetermined position of the controller lever.

10. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a pawl pivotally mounted in operative relation to one of said levers to engage a recess in the opposite lever, means for forcing the

pawl toward said recess, a nose upon said pawl, and a shoulder upon the lever located out of path of movement of said nose when the lever is in a running position.

- 5 11. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a
10 pawl pivotally mounted in operative relation to one lever to engage a recess in the opposite lever, means for forcing the pawl toward said recess, a nose upon the pawl, and
15 a shoulder upon the lever arranged to engage said nose and force the pawl away from the recess with the controller lever in an "off" or brake position, said shoulder being disengaged from said nose whenever the controller lever is in a running position.
- 20 12. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, said
25 reverse lever having a locking recess, a pawl pivotally mounted in operative relation to the controller lever, means for forcing the pawl toward said recess, a nose upon the pawl, and a shoulder upon the controller lever
30 arranged to engage said nose with the controller lever in an "off" or brake position, but to be disengaged from said nose with the controller lever in a running position.
- 35 13. In combination with the controller and reverse levers of a controller, the latter lever having a locking recess, a pawl having a pin engaging a recess in the shaft of the controller cylinder and also having a
40 retaining shoulder, a plate secured to the lever and resting against said shoulder, a spring exerting pressure upon said pawl, and means for allowing the pawl to engage said recess in a predetermined position of the controller lever.
- 45 14. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively,
50 and means operatively connected with one lever and movable independently thereof to engage a keeper on the other lever to automatically lock the reverse lever in a neutral position.
- 55 15. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a
60 locking bolt mounted on the reverse lever to register with a locking recess with the lever in a predetermined position, means for causing the bolt to engage the recess, and means for disengaging the bolt.
- 65 16. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a locking bolt mounted on the reverse lever to register with a locking recess with the lever in a neutral position, means for causing the bolt to engage the recess, and means for disengaging the bolt.
- 70 17. A controller including controller and reversing members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members, respectively, a locking bolt mounted on the reverse lever to register with a locking recess with the lever in a neutral position, means for causing the bolt to engage the recess, and means for disengaging the bolt.
- 75 18. A reverse lever, a locking lever mounted in the reverse lever and having a locking bolt to engage a locking recess, and a key adapted for insertion in the reverse lever to operate the locking lever.
- 80 19. A reverse lever, a locking lever pivotally mounted in the reverse lever and having a bolt upon one end to engage a locking recess, and a key to be inserted in the end of the lever to disengage said bolt from said locking recess.
- 90 20. A reverse lever, a locking lever pivotally mounted in the reverse lever and having a bolt to engage a locking recess, a cap secured to the end of the reverse lever and having a guide projection extending therefrom, and a key to be inserted through a slot in said cap to operate the locking lever.
- 95 21. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, means for locking the reverse cylinder in a neutral position, and means for holding the lock against operation.
- 100 22. A controller including controller and reverse members having suitable connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, means upon the reverse lever for normally locking said lever in a neutral position, and removable means for preventing operation of said lock.
- 105 23. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, a connection between said levers including a pawl mounted in operative relation to one lever and arranged to engage a recess in the other lever and permit movement of the reverse lever to the neutral position with the controller lever in any running position, and means upon the controller lever for removing
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ing the pawl from the recess whenever the controller lever reaches the "off" position.

24. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, means mounted in operative relation to one lever and movable independently thereof to engage a keeper on the other lever to automatically lock the reverse lever against movement in a predetermined position thereof and means for releasing said lock in a predetermined position of the controller lever.

25. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, and means operatively mounted in relation to one lever and movable independently thereof to engage a keeper on the other lever to automatically lock the reverse members against movement in a predetermined position thereof.

26. A controller including controller and reverse members having suitable electrical connections, a manually operated controller lever and a manually operated reverse lever operatively connected with the controller and reverse members respectively, and means mounted in operative relation to one member and movable independently thereof to engage a keeper on the other lever and actuated by the movement of the reverse lever to lock said lever in a neutral position.

27. A controller including controller and reverse members having suitable electrical connections, a controller lever and a reverse lever operatively connected with the controller and reverse members respectively, and means mounted in operative relation to one lever to engage a keeper on the other lever and movable independently of either of said levers to lock the reverse lever in a neutral position.

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Witnesses:

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