C. E. LORD.

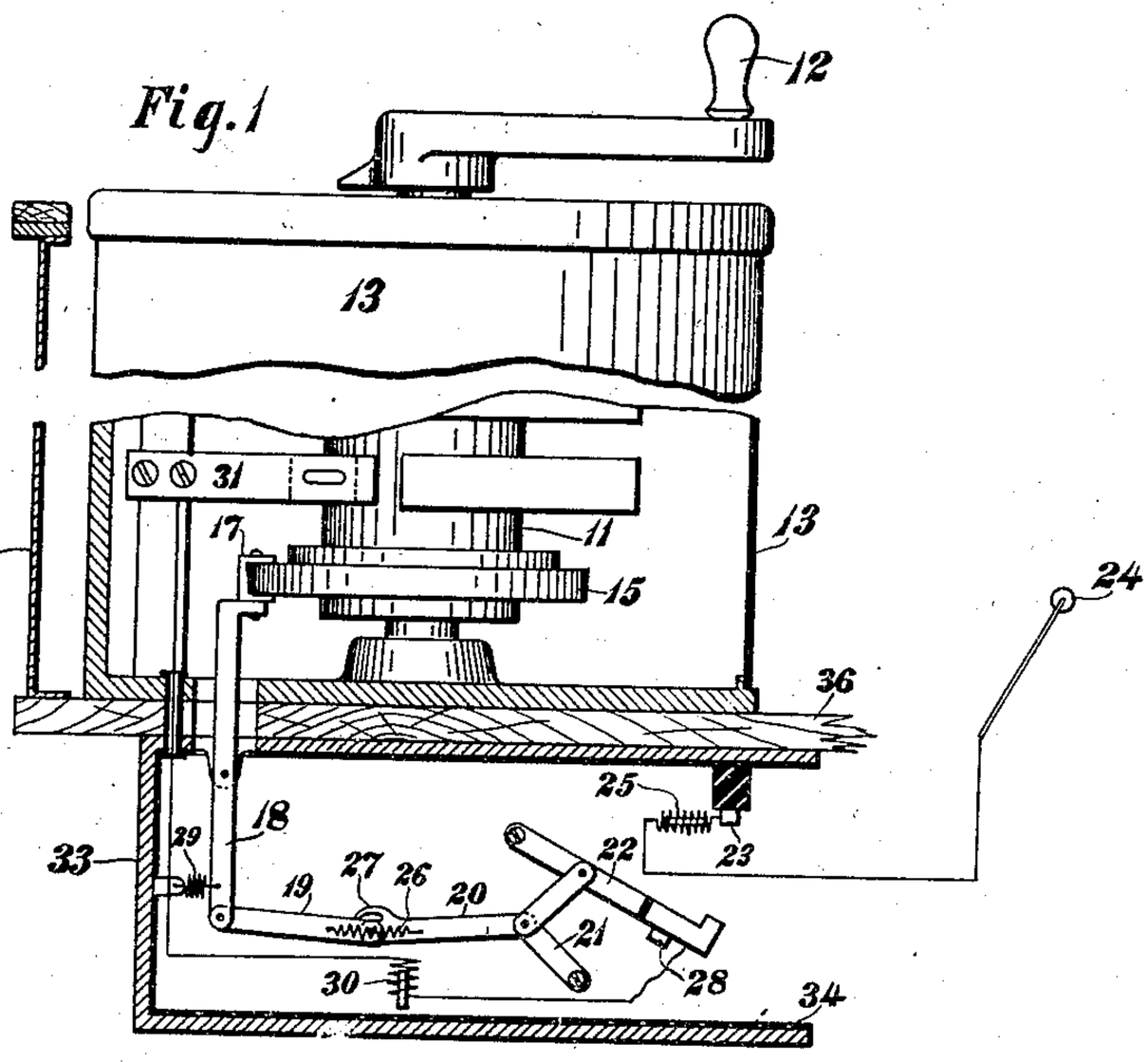
CONTROLLER.

APPLICATION FILED JUNE 30, 1906.

983,380.

Patented Feb. 7, 1911.

Fig. 1



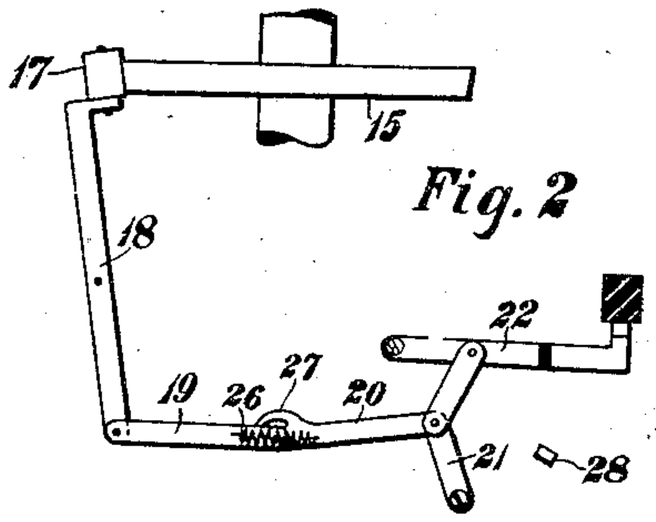


Fig. 2

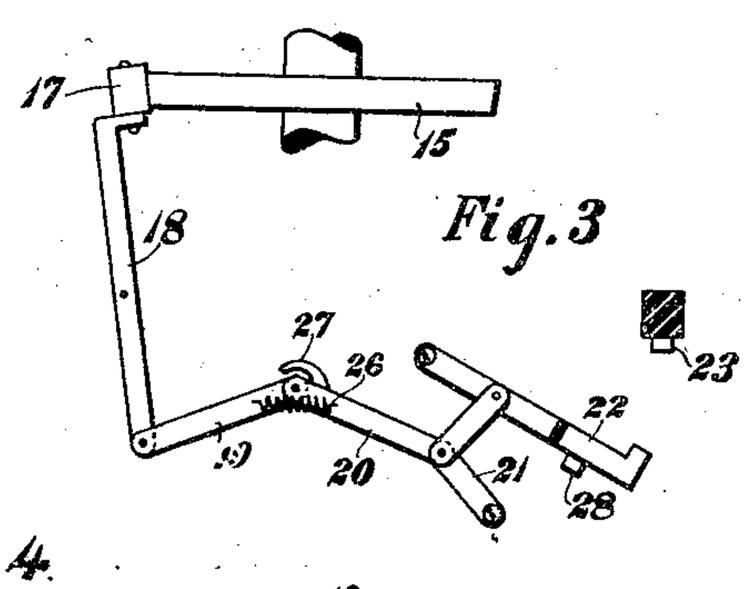


Fig. 3

Fig. 4.

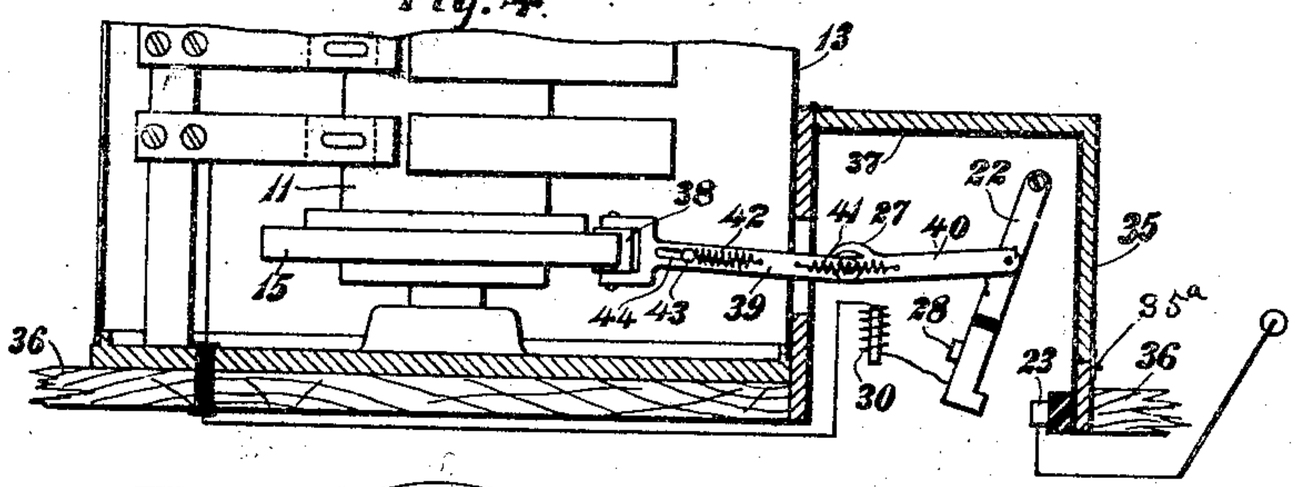
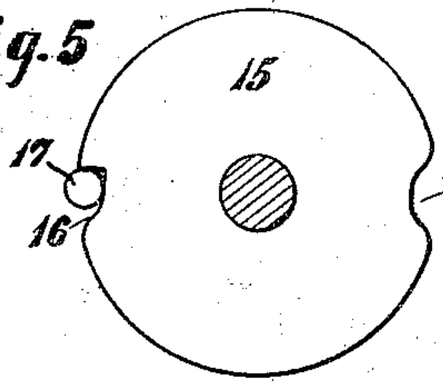


Fig. 5



WITNESSES

Oliver W. Sharman

Fred J. Kinsey

INVENTOR

Chas. E. Lord

UNITED STATES PATENT OFFICE.

CHARLES E. LORD, OF NORWOOD, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY.

CONTROLLER.

Specification of Letters Patent. **Patented Feb. 7, 1911.**

983,380.

Application filed June 30, 1906. Serial No. 324,130.

To all whom it may concern:

Be it known that I, CHARLES E. LORD, citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Controllers, of which the following is a full, clear, and exact specification.

My invention relates to controllers for electric motors and especially to arrangements for preventing flashing at the controller contacts.

It frequently happens, especially when a car is being "notched along", that dangerous arcing or flashing occurs at the controller contacts when the controller is moved to "off" position. Some times this flashing will burn out the controller and absolutely disable the car. Moreover such flashing often frightens the passengers.

It is the object of my invention to entirely avoid flashing at the controller contacts and to break the motor circuit at such a place that not only are the controller contacts not obliged to take the arcing but the passengers are prevented from seeing such arcing.

In one aspect my invention consists of a controller for electric motors and a switch separate from the controller and in series therewith and so arranged that it is opened by the contoller just before the latter is moved to "off" position.

In a more specific aspect my invention consists of a controller, a notch plate on the shaft thereof, and a switch outside of the controller casing and arranged to be operated by the controller drum to open the motor circuit just before said circuit is opened at the controller.

Other objects and features of my invention will appear from the specification and drawings and will be particularly pointed out in the claims.

Figure 1 is an elevation of a controller embodying my invention, showing the position of the parts when the controller is in "off" position. Fig. 2 is a fragmentary view, showing the position of the parts when the controller is in "on" position. Fig. 3 is a view similar to Fig. 2, but showing the position of the parts when the switch has been tripped by the overload coil. Fig. 4 shows a modification. Fig. 5 is a plan view of the notch plate which operates the safety switch.

In the drawings, 11 shows the controller drum, which may be of any desired type. This drum is operable by the usual handle 12, is inclosed in a casing 13, and is shown mounted in the usual manner against the front dash-board 14 of the car.

At the bottom of the controller and mounted on the shaft of the controller drum is a notch-plate 15, best shown in Fig. 5. This notch plate has a notch 16, in which in the "off" position of the controller is seated a roller 17 mounted on the upper end of a lever 18. Besides the notch 16 the notch-plate 15 may have one or more other notches 16^a, if used in those controllers in which the circuit is broken in other than the "off" position. Connected to the lower end of lever 18 is an arm 19 which in turn is joined to an arm 20. Arm 20 is connected to the knee of a toggle lever 21, one end of which is fixed and the other end of which is connected to the movable member 22 of a safety switch. The fixed contact 23 of this switch is connected through a blow-out coil 25 to the trolley or other current collecting device 24. Two points on the arms 19 and 20 are connected by a spring 26. This spring always tends to move the adjoining ends of these arms farther away from the line joining their remote ends. When the two arms are as shown in Figs. 1 and 2, the spring 26 is prevented from moving them farther, by reason of the engagement between arm 19 and finger 27 on arm 20. If for any reason, such as hereinafter explained, the adjoining ends of arms 19 and 20 are moved to the other side of the line through their remote ends, the spring 26 will continue this movement until the switch arm 22 strikes stop 28. Ordinarily the two arms 19 and 20 will act as one solid arm connecting the knee of the toggle 21 to the lower end of lever 18. The lower end of lever 18 is pulled to the left by a spring 29.

The movable member 22 of the switch is connected, through an overload coil 30, to one of the contact fingers 31 of the controller. In case of an overload, the overload coil 30 raises its core 32 and throws the adjoining ends of arms 19 and 20 above the line joining their remote ends, thus allowing the spring 26 to open the switch.

The safety switch and all its operating parts, with the exception of the notch plate 15 and the upper end of lever 18 are inclosed in a box 33, which if desired may be lined with some insulating and refractory material 34. This box is not only outside of the controller casing 13 but is below the car floor 36, and its only opening is to the rear. Hence any arc which may occur and the gases therefrom may escape without damaging anything.

The operation is as follows: When the controller is in "off" position the parts are as shown in Fig. 1. When the controller is moved forward the proper contacts of the controller are brought into engagement and then the notch-plate 15 moves lever 18 to straighten toggle 21 and close the safety switch 22, 23. The forward movement of the controller now changes the connections of the motors in any desired or usual manner. When the controller is moved backward to "off" position the notch 16 allows roller 17 to move to open the safety switch just before the circuit is broken at the controller contacts, thus avoiding flashing at the latter. Should an overload occur at any time, the coil 30 lifts its core 32 as hereinbefore described and the spring 26 moves the parts into the position shown in Fig. 3. In order to reset the arms 19 and 20 in the position shown in Fig. 1, the controller must be moved into "off" position, when the spring 29 will move the lower end of lever 18 to the left and straighten out the arms 19 and 20.

Should the controller be one of those which while changing the connections of the motors, as from series to parallel, interrupts the motor circuits, this interruption is caused to take place at the safety switch instead of at the controller contacts, because of the notch or notches 16^a in the notch-plate 15. Only one of these notches 16^a is here shown and it is so placed that in either the forward or the backward movement of the controller, it allows the roller 17 to move to the right (see Fig. 1) to open the safety switch just before the circuit is broken at the controller to change the motor connections. If desired, these notches 16^a may be entirely omitted, for generally even when the controller breaks the circuit at any intermediate point in its movement the motors have sufficient counter-electromotive force to make the arcing at such breaking comparatively harmless.

In the modification shown in Fig. 4 the safety switch is not below the floor of the car, but is located in a box 35 above the car floor 36 and adjacent to the controller casing 13. The upper part of box 35 is hinged to the lower part at 35^a. By reason of this arrangement the safety switch can be inspected or repaired without going below the car, while at the same time the box 35 lined with refractory material 37 is sufficient to keep the flash from being visible to the passengers. In order to allow the arc and its accompanying gases to escape, the box 35 has an opening below the car floor 36. The notch plate 15 in the modification shown in Fig. 4 may be the same as in the modification shown in Fig. 1, but is so placed on the shaft that when in "off" position its notch 16 will coöperate with the roller 38 mounted in one end of a bar 39. The bar 39 is connected to a bar 40 which in turn is connected to the movable member 22 of the safety switch. The bars 39 and 40 are also connected by means of a spring 41 similar in purpose and operation to the spring 26 described in connection with the modification in Fig. 1. As the controller is moved to any position in which circuit is broken, the switch 22 is opened first by a spring 42 attached between a fixed pin 43 and a point on bar 39. Pin 43 extends through a slot 44 in bar 39 so as to form a support therefor. The operation of this modification is similar to that of the one shown in Fig. 1 and need not be described in detail.

Many modifications can be made in the particular arrangement and construction of the parts herein shown and described, and I aim in the appended claims to cover all such modifications as are within the scope of my invention.

What I claim is:—

1. In combination, a controller for electric motors, a casing therefor, and a switch outside the controller casing and open to the atmosphere and arranged to be operated by the controller and to be opened upon abnormal circuit conditions.

2. In combination, a motor controller, a casing therefor, a switch in a separate casing, and means whereby said switch is opened just before the controller opens the motor circuit, or when abnormal conditions in the motor circuit arise.

3. In combination, a controller for electric motors, a casing therefor, and a switch outside of the controller casing and open to the atmosphere at an out-of-the-way place and arranged to be mechanically operated by the controller always to open the motor circuit just before said circuit is opened at the controller.

4. In combination, a controller for electric motors, a casing therefor, a switch in a separate casing, said casing being open to the atmosphere at an out-of-the-way place, and mechanical connections between the controller and the switch whereby the latter is opened just before the controller is moved to "off" position.

5. In combination, a controller for electric motors, a switch separate from said controller and arranged to be opened when the controller is about to break the motor cir-

cuits or when an overload on the motor occurs.

6. In combination, a controller for electric motors, a casing therefor, an over-load magnet, a notch-plate on the shaft of the controller, and a switch outside the controller casing but arranged to be operated by said notch plate and by said overload magnet.

7. In combination, a motor controller, a casing therefor, a switch in a separate casing, said last named casing opening beneath the floor of the car, and means whereby said switch is mechanically operated by the controller at certain points in the movement of the latter.

8. In combination, a motor controller, a casing therefor, a switch outside of said casing, and means whereby said switch is tripped when the controller is about to break the motor circuit or when an overload on the motor occurs.

9. In combination, a motor controller, a switch separate therefrom but in series therewith, means for opening said switch when the motor circuit is about to be opened at the controller, and an overload coil for tripping said switch.

10. In combination, a series-parallel motor controller, and a switch separate therefrom but arranged to be mechanically operated thereby to open the motor circuits just before they are broken at the controller, said switch being open to the atmosphere.

11. In combination, a motor controller, a casing therefor, a switch open to the atmosphere and in series with and mechanically controlled by the controller but in a separate casing, and means whereby the switch is opened at certain predetermined points in its forward movement and at other predetermined points in its backward movement.

In testimony whereof I affix my signature, in the presence of two witnesses.

CHARLES E. LORD.

Witnesses:
GEO. B. SCHLEY,
FRED J. KINSEY