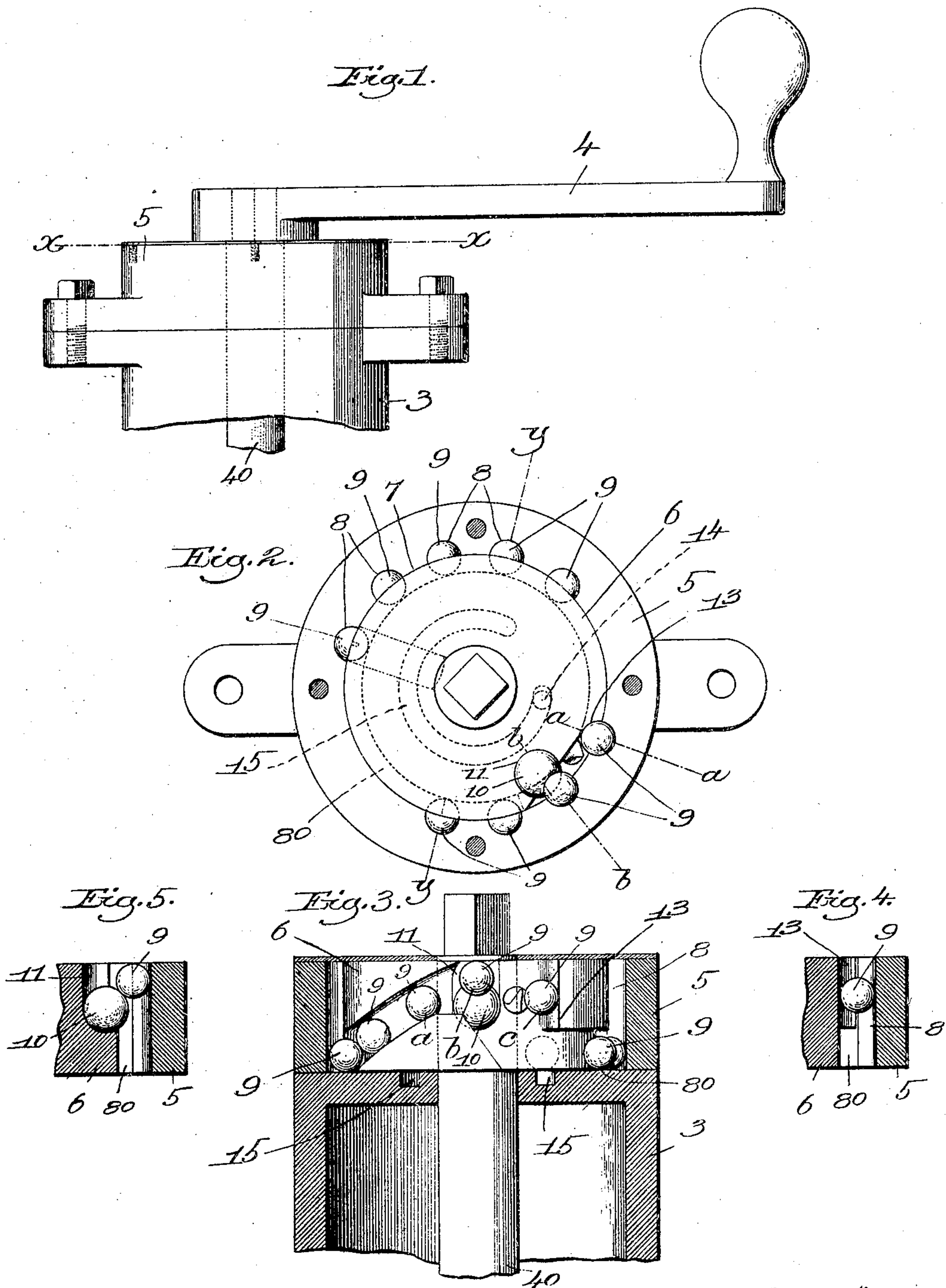


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F. A. & F. J. ROCHE.
 CONTROLLER FOR ELECTRIC CARS.
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Witnesses:
 Fred. S. Gumbaf.
 A. W. Knapp.

Inventors
 Francis A. Roche,
 Francis J. Roche,
 by Stanley May Jr. attys.

UNITED STATES PATENT OFFICE.

FRANCIS A. ROCHE AND FRANCIS J. ROCHE, OF SOMERVILLE,
MASSACHUSETTS.

CONTROLLER FOR ELECTRIC CARS.

No. 803,020.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, FRANCIS A. ROCHE and FRANCIS J. ROCHE, citizens of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have
5 invented an Improvement in Controllers for Electric Cars, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on
10 the drawings representing like parts.

This invention relates to a novel device to be used in connection with a controller or starting-box for an electric motor; and its object is to provide a mechanism which will prevent the operator from turning the full current on until after the motor has been speeded up. The device is especially useful and has been especially designed for use in connection with motors on electric cars, although it may
20 be applied to the switch mechanism of any other motor.

If the motorman on an electric car turns the controller-handle so as to apply the full current before the car is under way, the heat
25 generated by the current is very apt to either blow a fuse or burn out the armature or cause some other damage. The motormen are supposed to operate the controller-handle one step at a time, and thus turn on the current gradually until the car is under way; but they do
30 not always follow this rule.

The object of the present invention is to provide a device to be used in connection with the controller which will compel the motorman to
35 give the controller-handle an intermittent or step-by-step movement, and thus prevent him from turning the current on with one movement of the controller-handle. The device is so constructed that after the controller-handle
40 has been moved one step forward it is locked against further forward movement until the motorman gives said handle a slight backward movement to release it, when it can be moved forward to the second step, where it is brought
45 to rest and locked against further movement until the forward pressure on the handle has been relieved or the handle given a slight backward turn. With our improved construction, therefore, a motorman is compelled
50 to give the controller-handle a step-by-step or intermittent movement. The device is also

so arranged that the handle may be turned from the "on" to the "off" position with one movement, thereby permitting the motorman to instantly cut the current off the motor. 55

Figure 1 is an elevation of a controller having our improvements applied thereto. Fig. 2 is a section on line *x x*, Fig. 1. Fig. 3 is a section on line *y y*, Fig. 2. Fig. 4 is a section on line *a a*, Fig. 2. Fig. 5 is a section
60 on line *b b*, Fig. 2.

Our invention is illustrated as being applied to the controller of an electric car and is so constructed that it may be put on the controller of any car as an adjunct thereto. 65

In the drawings, 3 designates the controller on an electric car of any suitable or usual construction, and 4 is the controller-handle having the stem or shaft 40, which extends into the controller and carries the usual contact-
70 fingers.

5 designates a casing or box which may be placed on top of the controller 3, and 6 is a hub or rotary member within the casing or box and through which the shaft 40 extends,
75 said hub being made fast to the shaft in some suitable way. The inner wall 7 of the box or casing 5 is made with a plurality of guideways 8, one for each step or notch of the controller. Movable in said guideways are a
80 plurality of movable stop members 9, the function of which will be hereinafter described.

The hub 6 carries a movable cam member 10, which is herein shown as a ball movable in a groove or guideway 11 in the periphery
85 of the hub, and said hub is also formed with a cam-surface 12, which acts on the stop members 9 as the hub is revolved to move them into position to be further acted on by the cam member 10. The hub 6 is also provided
90 with a stop-shoulder 13, situated behind the cam member and operating as hereinafter set forth.

The stop members 9 normally occupy positions at the bottom of the guideways 8 and
95 are partially received in a groove 80 in the hub 6. The cam-surface 12 is so positioned that it engages the successive stop members as the hub 6 is rotated, thereby raising each one successively into the position *a*, (shown
100 in Fig. 3,) in which position each is engaged and further elevated by the cam member 10

as the hub continues its rotation. In the operation of the device the first movement of the hub 6 brings the cam-surface 12 under the first stop member and raises it into the position

5 *a.* (Shown in Fig. 3.) Further movement of the hub brings the movable cam 10 into engagement with the stop member, said cam operating to still further raise the stop member into position *b*, Fig. 3, until the former
10 has passed under the latter, as shown in Fig. 5. As the cam moves out from beneath the stop member the latter begins to slide down in its guideway to its initial position; but unless the hub is moving extremely slowly the
15 stop member is caught and engaged by the stop-shoulder 13, as shown in position *c*, thereby locking the hub, and consequently the controller-shaft, from further forward movement, as seen in Fig. 4. To release the hub, it is
20 necessary to turn it backwardly sufficiently to disengage the stop-shoulder from the stop member and allow said member to be sent to its initial position before turning the hub forwardly again.

25 The various stop members are located sufficiently near together so that when one stop member is passing over the movable cam the next preceding stop member is being raised by the cam-surface 12. It will thus be seen
30 that unless the controller-handle is moving very slowly it is necessary to give it a step-by-step or intermittent motion, as the stop members prevent any rapid movement from off to on position.

35 The movable cam member 10 is so constructed and located that when the hub 6 is turned backwardly it will ride over the stop members without elevating them, this construction permitting the hub to be turned from the
40 on to the off position with one movement, if desired.

It will be noted that the cam-surface 12 is shaped to engage and raise the stop members 9 during the backward movement of the hub.

45 The purpose of this construction is to bring each stop member into its secondary position, so that after the hub has been moved from any given notch back one stop it can be immediately moved forward to the same notch
50 again.

The stop members may be made of any suitable shape. We have found that balls answer the purpose of the invention and have therefore shown these stop members as balls operating in correspondingly-shaped grooves or
55 guideways. In the same way the movable cam member may be made in various shapes without departing from the invention. The cam member herein shown is merely a ball
60 which is arranged to play up and down in a groove in the hub, said ball acting as a cam to engage the stop members 9 and elevate

them, as above described. The invention, however, is not limited to this particular type of movable cam, and cams of other shapes may
65 be employed, if desired, without departing from the invention.

14 designates a stop-pin carried by the hub and operating in a groove 15 in the casing. Said stop-pin may be located either at the
70 bottom or at the top of the hub, as desired. We have herein shown it as located at the bottom. The purpose of this stop-pin and groove is to define the extreme limits of movement of the controller-handle.
75

From the above it will be seen that our improvements prohibit the motorman from turning the controller from off to on position with a single movement unless said movement is so slow as to permit the stop mem-
80 bers falling by gravity from the position shown in Fig. 4 to their initial position before they are engaged by the stop-shoulder, and as this can only occur when the hub is turned extremely slowly no harm can result.
85 If the controller-shaft is turned with any speed, it is locked or brought to rest at each step or notch until the motorman has turned the handle backwardly sufficiently to release the imprisoned or confined stop member. The
90 important feature of our invention is a plurality of movable stop members, a hub or rotary member having a cam member to engage and move said stop members successively, and a stop-shoulder or abutment carried by
95 the hub or rotary member to engage each stop member, and thus lock the hub from further movement until the stop member has been released by backward movement of the hub.
100

Various changes in the construction and arrangement of the parts may be made without departing from the invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—
105

1. In a device of the class described, a casing having a plurality of movable stop members, a hub rotatable in said casing, said hub having
110 a cam to engage and raise the stop members successively, and an abutment or stop-shoulder carried by the hub and adapted to engage the stop members when in their elevated position.

2. In a device of the class described, an annular casing having a plurality of vertical
115 guideways in its inner wall, a stop member movable in each guideway, a hub within the casing, a vertically-movable cam member carried by the hub and adapted to engage each stop member successively and raise it into
120 elevated position, and a stop-shoulder adjacent the cam member and adapted to engage each stop member when in its elevated position.

3. In a device of the class described, a mem-

ber secured to the controller-shaft to rotate therewith, said member having an abutment, a plurality of gravitating stop members, and a cam supported to move with the movable member, said cam in its movement engaging the stop members successively and raising each one into position to be engaged by the abutment as said member is turned, whereby said member is arrested in its turning movement.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANCIS A. ROCHE.
FRANCIS J. ROCHE.

Witnesses:

LOUIS C. SMITH,
MARGARET A. DUNN.