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G. Sargent Elliott.
Adella M Towle

By Nathan Fallick
H. S. Bailey Attorney.

UNITED STATES PATENT OFFICE.

NATHAN FALLEK, OF DENVER, COLORADO.

CONTROLLER-CHECKING DEVICE FOR STREET-RAILWAY CARS.

No. 920,300.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, NATHAN FALLEK, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Controller-Checking Device for Street-Railway Cars, of which the following is a specification.

This invention relates to improvements in controller checking devices for cutting out the resistance of controllers of electrically operated railway cars, starting boxes, motors, and the like.

The object of the invention is to provide a checking device of this character, which is positive in action, and that can be operated in any desired position, and that is interchangeable in order to be used in connection with any type of controller. Further, to provide a checking device for controllers, which is automatic in its action, simple in construction, and which insures a successive step by step movement of the controller crank in turning the current into the car motors. These objects are accomplished by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a plan view of the improved controller checking device arranged upon a common type of controller, the casing for the checking device being omitted. Fig. 2, is an elevation of the same, the casing being shown in section. Fig. 3, is a detail view in side elevation of the operating dog and pawl, and the engaging tension spring for restoring them to their respective initial positions. Fig. 4, is a detail perspective view of the dog. And Fig. 5, is a detail perspective view of the pawl.

Similar numerals of reference refer to similar parts throughout the several views.

Referring to the accompanying drawings, the numeral 1, designates a controller such as is commonly used on electrically operated street railway cars; 2, the controller shaft; and 3, the controller crank which is removably secured upon the upper end of the controller shaft.

Upon the top of the controller, and concentric with the axis of the controller shaft, is secured a circular plate 4, the controller shaft passing through a circular aperture in said plate. Above this plate, the shaft is squared or is preferably given any desired shape in cross section other than round, and upon the shaft is placed a ratchet disk 5, hav-

ing an axial hole corresponding to the shape of the shaft. The teeth of the ratchet disk point in the direction in which the disk is turned in admitting the current to the motor, and the shoulders of the teeth, instead of radiating from the center of the disk, are slightly undercut or at a tangent to the center of the disk. A circular row of threaded holes 6, is formed in the disk, adjacent to the face of the teeth, and each hole is in radial line with the point of a tooth. In these holes are screwed pins 7, having wrench-receiving portions 8, about midway of their length, which are adapted to rest upon the ratchet disk when the screws are inserted. These pins are preferably arranged in two groups, the number of pins in each group being determined by the style of controller upon which the checking device is used. In the drawings seven pins are shown in one group and three in the other group, but the number of pins may be increased or diminished to meet conditions.

Upon the plate 4, adjacent to the ratchet disk, is pivotally mounted a pawl 9, and upon the pawl rests a dog 10, having a finger 11, which extends above the top of the ratchet disk and across the path of the pins 7. The pawl and dog are provided with pivot holes 12 and 13 respectively, and a screw 14 passes through the two holes and into the plate 4, and forms a pivot for the said dog and pawl, either of which can move upon the pivot independently of the other. The pawl and dog have projecting ribs or lugs 15 and 16 respectively, which are engaged by the opposite ends 17 and 18 respectively of a coil spring 19, which is mounted upon a screw 20, which projects from the plate 4. The spring is held under tension by a pin or screw 21, which passes between its ends and into the plate 4. The lower end 17, of the spring, prevents excessive outward movement of the engaging end of the pawl relatively to the ratchet disk, while the upper end 18 of the spring exerts a counter pressure upon the dog to that exerted by the pins 7, as they engage and pass the finger 11. A vertically disposed recess 22, is formed in the side of the dog opposite the lug 16, and a pin 23 projects upward from the pawl and lies in the recess 22. This pin is of less width than the recess, and the opposite actions of the ends of the spring 19 cause the inner face 24 of the recess 22 to engage the pin 23, when the finger 11 is not acted upon by one of the pins 7,

at which times the pawl and dog maintain a fixed position relatively to each other.

In Fig. 1, the controller crank—shown in dotted lines—is against or adjacent to the starting side of the stop post A, and with the ratchet disk in this position, the first pin in the group of seven pins is in engagement with the finger 11 of the dog, while the free end of the pawl is in line with the ratchet tooth opposite the second pin of the group. When the disk is turned, the first pin contacts with the finger 11, and moves the dog a slight distance independently of the pawl, owing to the greater width of the recess 22 in the dog over the pin 23 of the pawl, which lies in the recess, and as the pawl remains stationary during this portion of the movement of the dog, the ratchet tooth opposite the second pin passes under the end of the pawl and is not engaged thereby; but a further movement of the dog brings the outer face 25 of the recess 22 against the pawl pin 23, whereby the pawl is moved with the dog, toward the ratchet wheel, and when the dog escapes the pin, immediately the tooth opposite the third pin in the group engages the end of the pawl, which stops the wheel, and to advance the wheel another step it is only necessary to release the pressure on the crank, when the upper end 18 of the spring 19 will throw the dog in the opposite direction, and the inner face 24 of its recess 22 will again contact with the pawl pin 23 and throw the pawl out of the path of the teeth.

A series of radially disposed indicating lugs 26, are found on the top of the controller in the sweep of the crank, and these lugs are in groups corresponding to the groups of pins on the ratchet wheel, and occur at intervals corresponding to the ratchet teeth, and at points where the wheel is stopped by the pawl. As the wheel is advanced, the dog and pawl limit it to a step by step movement, and the current passes gradually to the motors through the resistance element of the controller, and as the wheel can only be advanced in this manner, the motorman is prevented from throwing the full current into the motors too suddenly, thereby preventing injury to the controller resistance, and the too sudden starting of the car. When the dog escapes the last pin of the group of seven, the crank registers with the indicating lug marked "off", and the current is then passing direct to the motors, which are connected in series independent of the controller, and from this point until the crank engages the stop post A, the motors are arranged in parallel order. A casing 27, incloses the ratchet wheel, and its locking mechanism, and this casing is secured to the circular plate 4. A sleeve 28, having an annular groove 29, is secured in an axial aperture 30, in the top of the casing, by screws 31, which pass through a short hub 32, surrounding the aperture 30,

and into the annular groove 29. The sleeve aperture 33, corresponds in shape to the cross section of the controller shaft, which passes through it, and as the shaft is turned by the crank, the sleeve turns with it in the aperture 30 of the casing.

In operation the plate 4, with the ratchet wheel and its locking mechanism, are slipped upon the controller shaft so as to rest upon the controller, to which the plate 4 is then secured, the ratchet wheel having been supplied with pins arranged as to number and grouping to correspond to the style of controller used. The casing is then secured to the plate 4, and the crank is placed upon the top of the controller shaft and at the starting point of its rotative movement. The crank is then rotated, and the pins successively engage and partially rotate the dog, which moves the pawl into the path of a tooth, which it engages the instant the pawl escapes the pin, and stops the wheel. The motorman then releases the pressure on the crank and the pawl is thrown out of the path of the ratchet teeth by the dog, which immediately thereafter is again engaged by the next succeeding pin, and thus the operation progresses until the crank contacts with the stop post A, when the full current is running to the motors. The reverse movement of this crank causes the pins 7 to engage the opposite end of the finger of the dog, which is moved successively out of the path of the pins, and as it carries the pawl with it by the contact of the face 24 of its recess 22 with the pawl pin 23, the lug 15 on the said pawl engages the lower end 17 of spring 19, which exerts sufficient pressure upon the lug to return the pawl and dog to their initial positions.

The invention provides a simple and practical checking device for controllers, which is positive in operation and insures a step by step movement of the controller shaft, whereby the current is gradually turned into the motors and injury to the controller resistance, as well as the too sudden starting of the car, are prevented.

Having described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In a controller checking device, the combination with a controller and its shaft, of a plate secured to said controller through which the controller shaft passes; a ratchet wheel secured to the shaft and resting upon the plate; projections on the ratchet wheel; a pivoted pawl adjacent to the ratchet wheel; and means operated by the projections for throwing the pawl to successively engage the ratchet teeth and stop the wheel.

2. In a controller checking device, the combination with a controller and its shaft, of a ratchet wheel secured upon the shaft; projections on the ratchet wheel; a pivoted

pawl adjacent to the ratchet wheel; a pivoted dog connected with the pawl so as to have a limited movement independently thereof, and operated by the projections for throwing the pawl to successively engage the ratchet teeth and stop the wheel.

3. In a controller checking device, the combination with a controller and its shaft, of a ratchet wheel secured upon said shaft, having projections on its upper face; a pivoted pawl adjacent to the ratchet wheel; a dog operated by the projections for throwing the pawl to successively engage the ratchet teeth and stop the wheel; means connecting the dog and pawl whereby the dog has a limited movement independently of the pawl and means for restoring the dog and pawl to their initial positions.

4. In a controller checking device, the combination with a controller and its shaft, of a ratchet wheel secured upon the shaft having pins projecting from its upper face; a pawl adjacent to the wheel; a spring controlled dog in the path of the pins; a pin projecting from the pawl and connecting the dog and pawl whereby the latter is thrown into engagement with the ratchet wheel by the dog when the dog is moved by the ratchet wheel pins.

5. In a controller checking device, the combination with a controller and its shaft, of a ratchet wheel secured to the said shaft; pins projecting from the upper face of the ratchet wheel; a pawl adjacent to the ratchet wheel; a dog mounted on the pawl and a common pivot pin for both; a spring engaging the dog and pawl; and means connecting the dog and pawl whereby the dog has a limited movement independently of the pawl, after which it moves the pawl to engage the ratchet wheel.

6. In a controller checking device, the combination with a controller and its shaft, of a ratchet wheel on the shaft, having pins projecting from its upper face; a pawl adjacent to the wheel; a dog mounted on the pawl and projecting across the path of the pins, having a recess in one side; a common pivot pin for said pawl and dog; a spring adapted to exert pressure on the pawl and dog, in opposite directions; and a pin projecting from the pawl into the recess of the dog, said pin being of less width than the recess.

7. In a controller checking device as described, the combination with a controller and its shaft, of a ratchet wheel secured upon the shaft, having a circular series of threaded holes; a plurality of threaded pins in said holes; a dog projecting across the path of the pins and having a recess in one side; a pawl beneath the dog, and a common pivot pin for both; projections on said dog and pawl; a coil spring, the ends of which engage the said

projections; and a pin projecting from the pawl into the recess of the dog, said pin being of less width than the recess.

8. In a controller checking device as specified, the combination with a controller and its shaft, of a ratchet wheel on the shaft, having projecting pins; a dog in the path of the pins having a recess in one side and a projection on the other side; a pawl beneath the dog, having a projection in line with the projection on the dog; a pin extending from the pawl into the recess of the dog, and of less width than said recess; a pin; a coil spring mounted on the pin, having extended ends which engage the projections on the dog and pawl; a pin between the said ends of the spring for holding the said spring under tension; and a common pivot pin for the dog and pawl.

9. In a controller checking device as specified, the combination with the controller and its shaft, of a ratchet wheel on the shaft, having projections; a pivoted dog in the path of the projections, spring controlled in one direction; a pawl operated by the dog for engaging the ratchet wheel simultaneously with the escape of the dog from the projections, and a pin connecting the pawl and dog whereby the latter has a limited movement independently of the pawl.

10. In a controller checking device as specified, the combination with a controller and its shaft, of a ratchet wheel on said shaft having projections; a pawl adjacent to the wheel; a dog upon the pawl projecting into the path of the projections, and a common pivot for both; means connecting the dog and pawl, whereby the latter is caused to engage a tooth of the ratchet wheel, simultaneously with the escape of the dog from a projection; and a spring for restoring the dog and pawl to their initial positions.

11. In a controller checking device, the combination with the controller and its shaft; a ratchet wheel on the shaft, having projections; a dog in the path of the projections; a pawl operated by the dog for engaging a tooth of the ratchet wheel as the dog escapes; a projection and a spring for restoring the dog and pawl to their initial positions; of a casing for said mechanism having an axial hole; a sleeve in said axial hole having an annular groove and an axial hole conforming to the shape of the controller shaft, through which said shaft passes; and screws passing through a rim on said casing and into the annular groove of the sleeve.

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

NATHAN FALLEK.

Witnesses:

G. SARGENT ELLIOTT,
ADELLA M. FOWLE.