

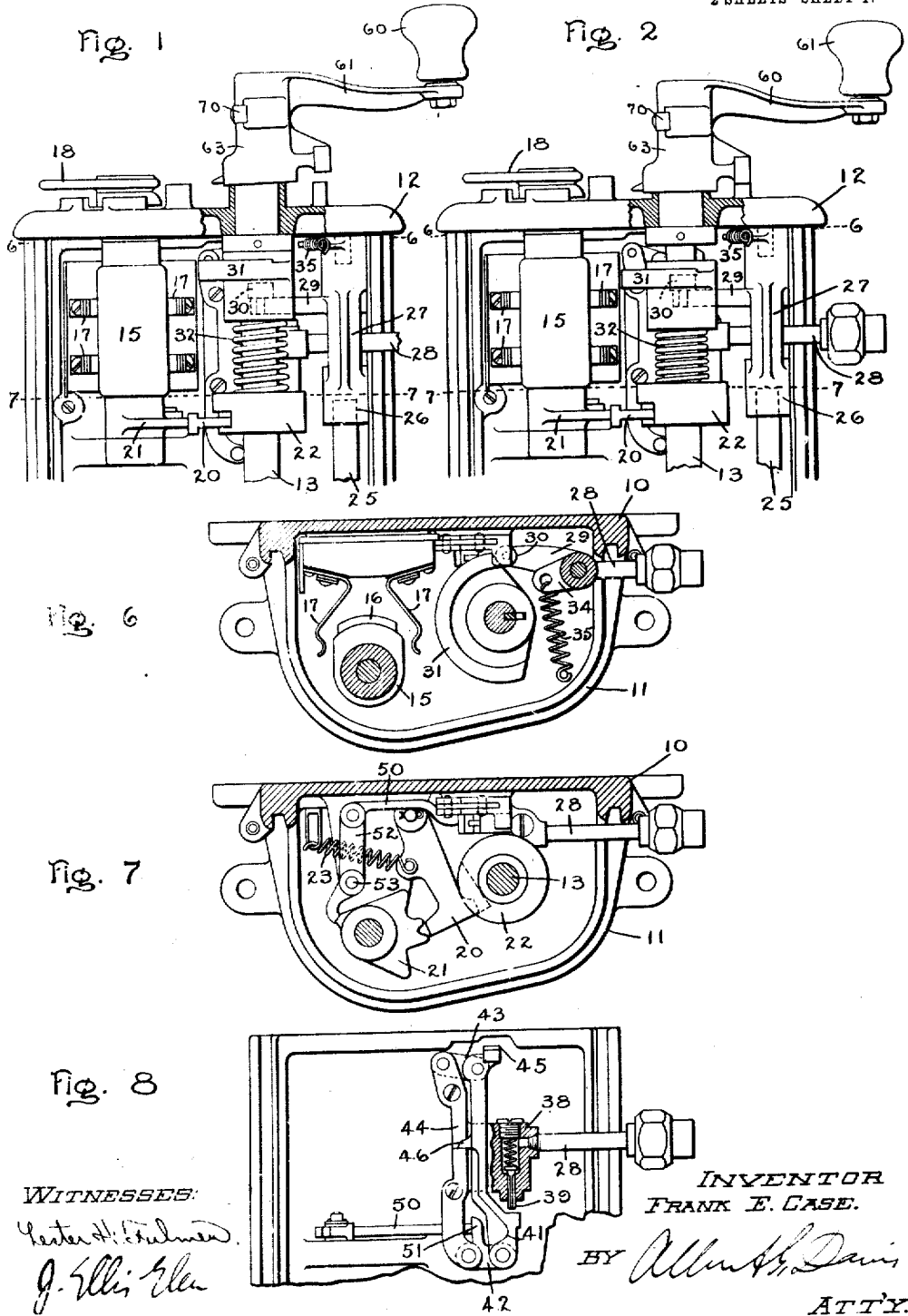
F. E. CASE.
CONTROLLER.

APPLICATION FILED NOV. 2, 1908.

Patented Feb. 8, 1910.

2 SHEETS-SHEET 1.

948,442.



WITNESSES:

Yester H. Paulman
J. Ellis Allen

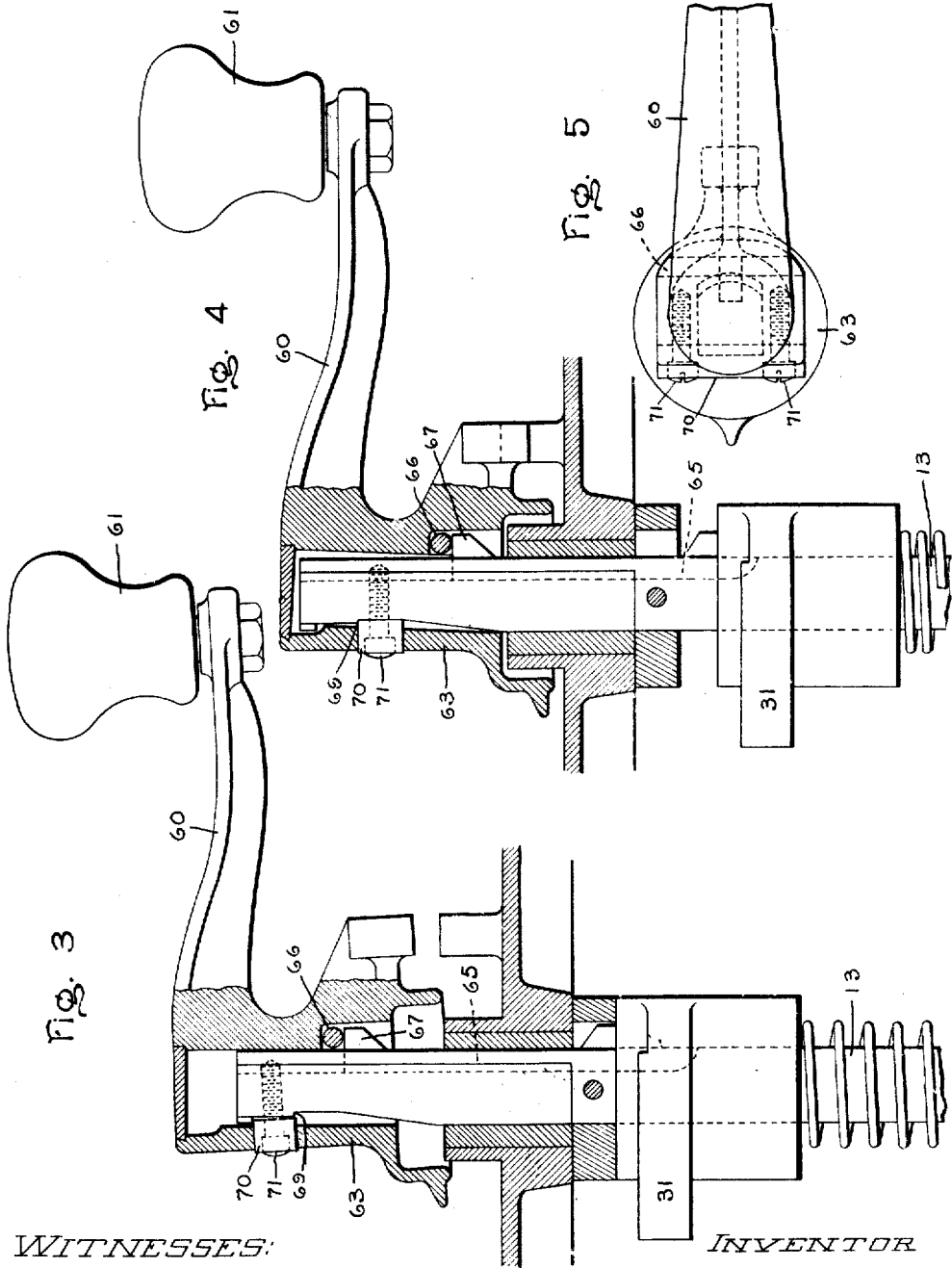
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948,442.

Patented Feb. 8, 1910.

2 SHEETS—SHEET 2.



WITNESSES:
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UNITED STATES PATENT OFFICE.

FRANK E. CASE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CONTROLLER.

948,442.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed November 2, 1908. Serial No. 460,612.

To all whom it may concern:

Be it known that I, FRANK E. CASE, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Controllers, of which the following is a specification.

My invention relates to controllers for electric motors, and is particularly applicable to controllers now extensively used in the operation of electrically driven cars. In this service the controllers are often provided with so-called "dead man's handles," the function of which is to cause the interruption of the motor circuit and sometimes, also, the application of the air brakes if the motorman, for any reason, takes his hand from the operating handle during operation. A well known form of such apparatus is set forth in the patent to Crocker, No. 872,990, dated December 3, 1907, in which the button on the controller handle, normally depressed by the hand of the operator, during operation, when released allows the automatic operation of suitable mechanism in the controller to cause interruption of the motor circuits and application of the air brakes.

My invention relates particularly to controllers provided with one or both of the emergency devices above mentioned, and has for its object to provide a new and improved form and arrangement of controller handle and operating mechanism for the emergency devices.

To the above end, my invention, briefly stated, comprises a handle mounted on the controller shaft and having a limited sliding movement thereon, said handle being operatively connected to the emergency devices.

For the purpose of illustration I have shown my invention as applied to a controller having emergency devices constructed and arranged substantially as set forth in the patent to Crocker No. 872,990, above referred to, and as shown and described in an application filed concurrently herewith in the name of Arthur T. Crocker, Serial No. 460,614. It is obvious, however, that my invention may equally well be used in connection with many other forms of control apparatus.

Referring to the drawings, Figure 1 is an elevation, partly in section, of the upper

portion of a controller provided with my invention, the casing being removed and the mechanism being in the position which it assumes when the handle is released by the operator; Fig. 2 is a view, similar to Fig. 1, except that the handle is shown in its depressed position and the operating mechanism of the emergency devices arranged accordingly; Fig. 3 is an enlarged view, partly in cross-section, of the upper portion of the controller shaft and handle, the latter being shown in its upper position; Fig. 4 is a view similar to Fig. 3 with the handle in its lower position; Fig. 5 is a plan view of the hub of the controller, certain parts thereof and the controller shaft being shown in dotted lines; Fig. 6 is a horizontal cross-section through the controller approximately on the lines 6-6 of Figs. 1 and 2; Fig. 7 is another horizontal cross-section approximately on the lines 7-7 of Figs. 1 and 2, certain parts being omitted for the sake of clearness; and Fig. 8 is an elevation, partly in section, showing a portion of the operating mechanism for the emergency brake controlling valve.

Referring to the drawings, the backboard of the controller is indicated at 10, the base at 11 and the top at 12, these parts being of a well known design.

At 13 is shown the main shaft of the controller from which the main drum may be driven through gearing or operated in any other suitable manner.

A reversing switch is shown as comprising a drum 15 carrying contact segments 16 which cooperate with fingers 17 in a well known manner. The shaft of the drum 15 extends upward through the top plate 12 and is adapted to receive a removable reversing handle 18. In order to lock the main drum of the controller when the reversing switch is in its "off" position, and to prevent the reversing switch from being moved when the main controller drum is in an "on" position, a mechanical interlock between the reverser shaft and the main shaft is generally used and, in the present construction, is shown as comprising a pivoted dog 20, the toe of which engages with a toothed segment 21 on the shaft of the reverser, while the heel engages with a notched collar 22 fixed on the main shaft 13, a spring 23 serving to hold the dog yieldingly in engagement with the segment. The construc-

tion and arrangement of this interlocking mechanism will be clear from Fig. 7 and need not be further described since it forms no part of my invention.

5 The emergency circuit breaker may be of exactly the same construction as that shown in the patent to Crocker, above mentioned. The movable member (not shown) of the circuit breaker is mounted on a shaft 25, the
10 upper end of which is embedded in a casting 26 pivotally mounted on the bottom of the top plate 12. This casing 26 has an outwardly extending web portion 27 which extends around the pipe 28, hereinafter referred to, this construction allowing the parts to be arranged in a compact form. Extending from the casting 26 is an arm 29, the end of which carries a roller 30 which engages with a cam 31 secured to rotate
20 with, but having a limited sliding movement upon the shaft 13. The cam 31 is biased in an upward direction by the spring 32 and in its upper position is out of engagement with the roller 30. The casting 26 also has extending from it an arm 34 between which and a pin extending downwardly from the top plate 12 a spring 35 is located. This spring 35 serves to bias the circuit breaker to an open position and to hold the roller
30 30 in engagement with the cam 31, the construction and arrangement of these parts being similar to that of the corresponding parts in the patent above referred to. The pipe 28, which communicates with the train pipe of the air brake system, extends into the controller and at its end is provided with a valve 38 of well known form, shown in cross-section in Fig. 8, having a valve stem 39 which projects from the casing, said valve
40 being biased to a closed position by means of a spring and the pressure in the train pipe.

The mechanism by which the emergency air brake valve 38 is operated is best shown in Figs. 7 and 8. The lower end of the valve stem 39 is engaged by a member 41 pivotally connected by links 42 and 43 with a bracket 44 secured to the back of the controller. The upper part of the member 41 is provided with an extension having a lip 45
50 arranged to project horizontally out over the top of the cam 31 by which it is engaged in all angular positions of the cam. When the cam 31 is in its upper position the member 41 is forced upwardly against the valve stem 39 and the valve is opened, but when the cam is depressed the member 41 is allowed to drop and the valve 38 to close. A lug 46 on the member 41 engages with a shoulder on the bracket 44 and prevents the member 41 from dropping farther than is necessary. In order to maintain the valve 38 closed, except when the controller is in use, means is provided, as in the case of the
65 controller in the patent to Crocker above

referred to, for releasing the upward pressure of the valve stem when the reversing switch is in its mid-position. In the particular controller shown, this means comprises a rod 50, the end of which engages with an extension 51 on the link 42, this rod being moved longitudinally from the reversing shaft through the medium of a lever 52 pivoted at 53, one end of which is connected to the rod 50 while the other engages a cam surface formed on the segment 21, as is clear from Figs. 7 and 8. When the reverser is in its mid-position the rod 50 is moved to the right and the member 41 is forced downward, thereby releasing the valve stem 39; in either "on" position of the reverser, however, the upward pressure of the spring 32 on the cam 31 forces the member 41 upward and tends to hold the valve 38 open and the brakes applied, this action being unimpeded by the rod 50.

It will be observed that the construction and mode of operation of the mechanism for the operation of the emergency devices as described up to this point are substantially the same as shown in the patent to Crocker and in the Crocker application, above referred to.

I now come to the description of my new and improved form of controller handle which I have shown as adapted to cooperate with the particular arrangement of emergency devices above described. It will be clear, however, that my handle and its cooperating parts are in no way limited to use in connection with the particular internal construction of the controller shown.

Referring now particularly to Figs. 3, 4 and 5, my handle is shown as comprising an arm 60 having a grip 61, said arm being preferably integral with a hub 63 adapted to engage the top of the shaft 13 in a manner clearly shown in the drawings. The handle may be either permanently secured to the shaft or arranged for removal therefrom when the controller is not in use. The end of the shaft 13 is preferably made substantially quadrilateral in cross-section in order that the handle may be secured thereon and prevented from rotation with reference to it. In a keyway on one side of the shaft 13 a key 65 is arranged for sliding movement, said key at its lower end engaging with the top of the cam 31. This key 65 serves as a sliding connection between the cam 31 and the handle and is engaged at its upper end by a pin 66 secured in the handle as shown. The upper end of the key 65 is enlarged as shown at 67 in order to facilitate its engagement by the pin 66, and the lower end of the key may be similarly enlarged in order to provide a large engaging surface between it and the cam 31. The opening in the hub of the handle, with which the end of the shaft 13 cooperates, may be

of the form shown which allows vertical sliding movement of the handle on the shaft and a slight rotary movement in a vertical plane about the pin 66. The form of this opening in the hub will be clear from Figs. 3, 4 and 5, it being understood that Fig. 3 shows the handle in its upper extreme position of both sliding and rotary movements, while Fig. 4 shows the handle in its extreme lower position of both movements. On the opposite side of the shaft 13 from the key 65, a notch 69 is cut, and a lug 70, embedded in the hub 63 and secured thereto by screws 71, is arranged, when the handle is at the lower extreme position of both its sliding and rotary movements, to cooperate with said notch 69, as shown in Fig. 4. With such a construction it is clear that sliding movement of the handle upon the shaft will effect vertical movement of the key 65 and the cam 31 and, consequently, will regulate the operation of the emergency devices. During the downward movement of the handle it is necessary for the motorman to overcome the entire upward thrust exerted by the spring 32 on the cam 31, but when the handle has reached its extreme lower position the lug 70 enters the notch 69 and the slight rotation of the handle in a vertical plane which is then permitted brings the lug 70 and the upper surface of the notch 69 into engagement with one another. The upward thrust of the spring 32 is now largely taken by the controller shaft at the point where the lug 70 and the notch 69 cooperate since the handle now acts as a lever of which the fulcrum is the point at which the lug 70 and the upper face of the notch 69 cooperate. Under this condition it is clear that the downward pressure required on the grip 61 in order to hold the handle in its lower position, is much less than the force required to force the cam 31 downward in the first place. The operator is thus relieved from pressing heavily downward upon the handle during normal operation. If, however, at any time the handle is released, the upward tendency exerted upon the cam 31 by the spring 32 will act upon the pin 66, thereby rotating the handle upwardly about the lug 70 and causing disengagement of this lug from the notch 69, thereby permitting the handle to slide upwardly on the shaft and consequent rising of the cam 31 and the emergency operation of the emergency devices. In operating the device the operator may find it is easiest to place his hand on top or near the hub of the handle when initially forcing the same downward and after the dog and notch arrangement has locked to slide his hand out along the arm 60 until he finally grasps the grip 61 which he holds during operation of the controller. It is clear, however, that the handle may be so arranged that the whole

operation may be easily accomplished by initially applying the hand directly to the grip 61.

While I have shown but one embodiment of my invention, I do not wish to be understood as limiting myself thereto, since in the following claims it is my intention to cover all other arrangements which come within the spirit and scope of my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is,—

1. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and having a limited sliding movement thereon, an emergency device, and means for operatively connecting said handle and said emergency device whereby the sliding movement of said handle on the operating shaft operates said emergency device.

2. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and capable of a limited sliding movement thereon, an emergency device, and a sliding connection between said handle and said emergency device whereby sliding movement of said handle on the operating shaft moves said sliding connection and operates said emergency device.

3. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and having a limited sliding movement thereon, an emergency device, an operating connection between said handle and said emergency device whereby sliding movement of said handle on said shaft operates said emergency device, and means for biasing said handle in an upward direction.

4. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and having a limited sliding movement thereon, an emergency device cooperating with said controller, a connection between said handle and said emergency device whereby sliding movement of the former causes operation of the latter, means for biasing said handle in an upward direction, and means operative when said handle is moved downward for taking part of the upward thrust of said biasing means.

5. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and having a limited sliding movement thereon and a limited rotary movement thereon in a plane passing through said shaft and said handle, an emergency device cooperating with said controller, an operative connection between said handle and said emergency device whereby sliding movement of the former causes the operation of the latter, means for biasing said handle in an upward direction, and means operative when said handle is at the

lower limit of both its sliding and rotary movements for taking part of the upward thrust of said biasing means.

6. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and having a limited sliding movement thereon and a limited rotary movement in a vertical plane, an emergency device cooperating with said controller, a sliding connection between said handle and said emergency device, means for biasing said sliding connection and said handle in an upward direction, and means cooperating with said sliding connection and operative when the latter is at the lower limit of its movement for taking part of the upward thrust of said biasing means.

7. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and having a limited sliding movement thereon and a limited rotary movement in a vertical plane, an emergency device cooperating with said controller, a sliding connection between said handle and said emergency device located on one side of said operating shaft, means for biasing said sliding connection and said handle in an upward direction, and means located on the opposite side of said shaft from said sliding connection operative when said han-

dle is at the lower limits of both its sliding and rotary movements for transferring from said handle to said shaft a part of the upward thrust of said biasing means.

8. In a controller, an operating shaft, a handle mounted thereon arranged to rotate with said shaft and having a limited sliding movement thereon and a limited rotary movement in a vertical plane, an emergency device cooperating with said controller, a sliding key connection between said handle and said emergency device located in a keyway on one side of said operating shaft, means for biasing said key connection and handle in an upward direction, and a lug and notch connection between said handle and said shaft on the opposite side of said shaft from said key connection operative when said handle is at the lower limits of both its sliding and rotary movements for transferring from said handle to said shaft a part of the upward thrust of said biasing means.

In witness whereof, I have hereunto set my hand this 30th day of October, 1908.

FRANK E. CASE.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.