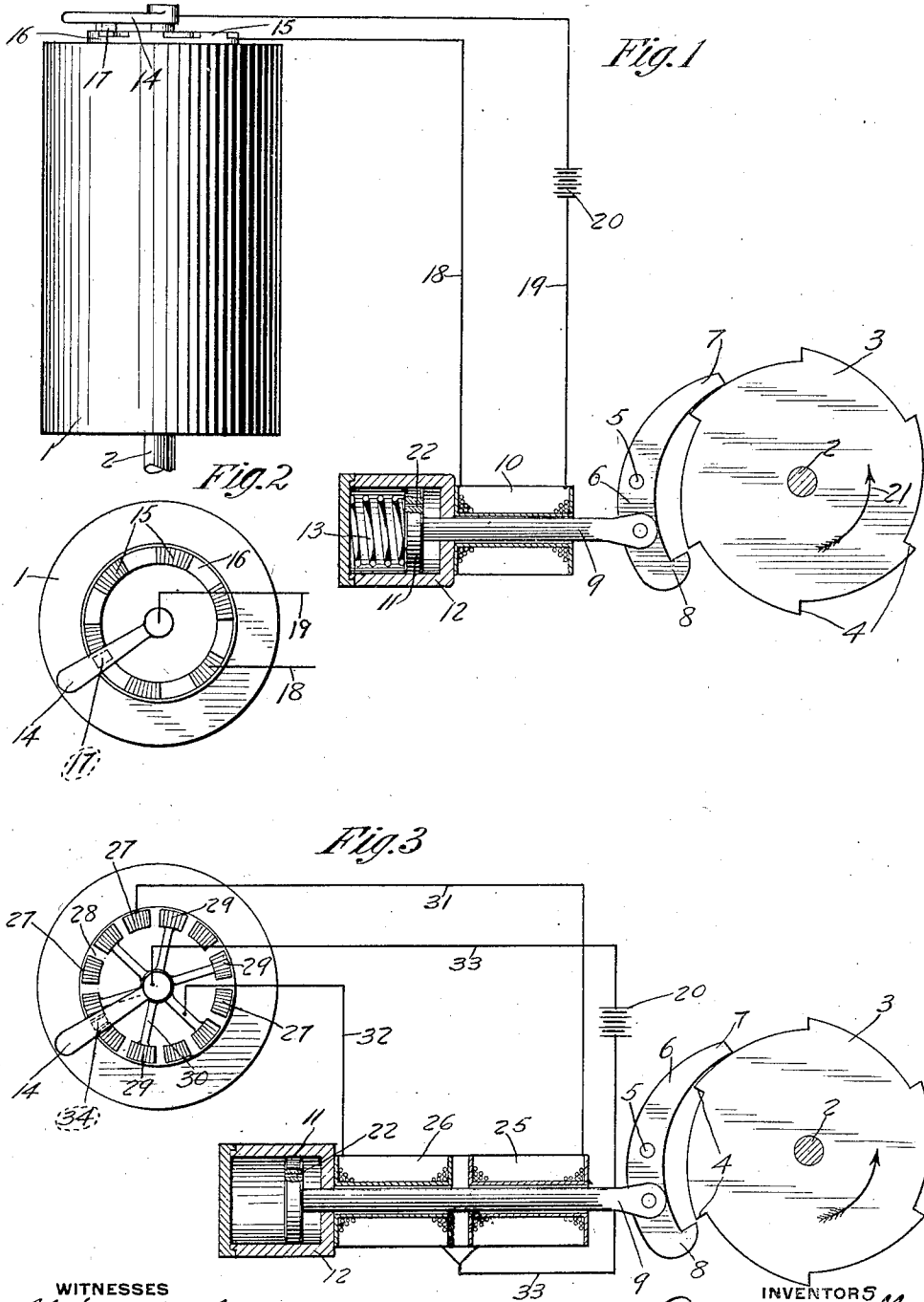


J. F. MILLER & W. V. TURNER.
SAFETY DEVICE FOR CONTROLLERS.
APPLICATION FILED JULY 8, 1911.

1,053,311.

Patented Feb. 18, 1913.



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SAFETY DEVICE FOR CONTROLLERS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, JOHN F. MILLER and WALTER V. TURNER, citizens of the United States, residents of Edgewood, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Safety Devices for Controllers, of which the following is a specification.

10 This invention relates to hand operated controllers, and more particularly to a safety device adapted for preventing the too rapid movement of the controller handle.

15 In the operation of controllers, and more especially hand operated controllers, such as are employed in electric traction service for controlling the car motors, the attendant is liable, at times, to turn the handle too fast, so that an excessive flow of current is produced which wastes energy and often causes injury to the apparatus. In order to obviate this difficulty, various devices have heretofore been proposed for preventing movement of the controller handle at a rate of 20 speed exceeding the desired safe limit.

25 The principal object of our invention is to provide an improved safety device of the above character.

30 In the accompanying drawing; Figure 1 is a more or less diagrammatic view illustrating a controller with our improvement applied thereto; Fig. 2 a plan view of the controller, showing the arrangement of contacts for controlling the safety device; and 35 Fig. 3 a diagrammatic view showing a slightly modified form of our improvement.

40 According to the construction shown in Fig. 1 of the drawing, the controller 1 has secured to its operating shaft 2 a ratchet wheel 3 having teeth 4. Mounted on a pivot 5 adjacent to the ratchet wheel 3 is an arm 6 provided with two pawls 7 and 8, one of which is adapted to engage the teeth 4 of the ratchet wheel upon movement of the arm 6 in one direction, the other pawl being adapted to engage with said teeth upon movement of the arm in the opposite direction.

50 For operating the arm 6, a core 9 of a solenoid coil 10 is pivotally secured to the

arm and the opposite end of the core 9 is preferably provided with a piston head 11 adapted to reciprocate in a closed cylinder 12. One side of the piston is subject to the pressure of a coil spring 13 tending to move 55 the piston in a direction opposite to that produced by the action of the solenoid coil 10.

Mounted on the controller in position to be controlled by the controller handle 14 are 60 raised contacts 15 electrically connected in any suitable manner, as by forming them integral with a conducting ring 16. A contact 17 is provided on the controller handle 14 for engagement with the fixed contacts 65 15. The number of contacts 15 corresponds with the number of teeth 4 in the ratchet wheel and said contacts are spaced apart so that in turning the handle 14, contact is alternately made and broken. The ring 16 70 and consequently the contacts 15 are connected by a wire 18 to one terminal of the solenoid coil 10 and the movable contact 17 is connected by a wire 19, containing a source of current 20, with the other terminal 75 of said solenoid coil.

The solenoid is of sufficient strength when energized to shift the core 9 against the resistance of the spring 13 and throw the pawl 7 into and the pawl 8 out of engagement 80 with the ratchet teeth 4, while upon opening the solenoid circuit, the spring 13 is adapted to throw the pawl 8 into and the pawl 7 out of engagement with the ratchet teeth.

85 In operating, assuming the parts in the position shown in Fig. 1, and the solenoid coil energized by closing the circuit through the engagement of the movable contact 17 with one of the fixed contacts 15, the pawl 8 will then be held out of engagement with 90 the teeth 4 while the pawl 7 is ready to engage one of the teeth 4 as the handle 14 is rotated in the direction of the arrow 21. The contacts 15 are of such length that just as or a little before the pawl 7 engages the 95 advancing tooth 4, the circuit is broken, so that as the pawl 7 engages a tooth 4, the spring 13 operates to shift the arm 6 so as to withdraw the pawl 7 and cause the pawl 8 to move into position for engaging the 100

ratchet teeth. It will now be evident that rotation of the handle 14 is temporarily stopped by the pawl 7 engaging a tooth 4 until the spring 13 throws said pawl out of its locking position. In order to lengthen the time required to shift the arm 6, the dash pot action of the piston 11 is preferably employed, and by varying the size of the equalizing port 22 through the piston, the speed may be regulated as desired. The pawl 7 having been thrown out, the handle 14 may be further rotated until the other pawl 8 engages a tooth 4. At or just before this point is reached, the moving contact 17 again engages one of the fixed contacts 15, so that the circuit of the solenoid coil is made and the core 9 operates to retract the pawl 8 while throwing the pawl 7 into position for engagement. It will thus be apparent that the speed at which the controller handle may be operated is limited by the temporary check effected through the alternate engagement of the teeth with the pawls 7 and 8.

In Fig. 3 of the drawing, a slightly modified construction is illustrated, in which two solenoids are employed, one for moving the ratchet arm in one direction and the other for moving the ratchet arm in the opposite direction, the spring 13 being thereby dispensed with. With this construction, the solenoid coil 25 is adapted when energized to move the core 9 outwardly or away from the ratchet wheel 3 while a solenoid coil 26 is adapted to move the core 9 in the opposite direction. The dash pot piston 11 may be employed for the same purpose as in the construction shown in Fig. 1. On the controller two sets of fixed contacts are provided, one set of contacts 27 being connected to a plate 28 and the other set of contacts 29 being connected together by means of a spider 30. The two sets of contacts are suitably insulated from each other and the contacts 27 are connected by a wire 31 with one terminal of the coil 25 while the other set of contacts is connected by a wire 32 with one terminal of coil 26. The other terminals of the coils 25 and 26 are connected to a common wire 33 containing a source of current 20 and leading to the movable contact 34 on the handle 14. The space intermediate adjacent contacts is slightly wider than the movable contact 34, so that contact with one fixed contact is broken before connection is made with the succeeding fixed contact. It will now be clear that upon the rotation of the handle 14, the circuits of the coils 25 and 26 are alternately closed and opened, so that the pawl 7 is moved into operating position when the coil 25 is energized while the pawl 8 is moved into operating position when the coil 26 is energized. The operation will evidently be the same as that of the con-

struction shown in Fig. 1, except that the coil 26 operates the core 9 and the arm 6 in one direction instead of the spring 13.

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

1. A controller provided with a handle, a device for locking the handle against movement, electrically controlled mechanism immediately responsive to energization to move said locking device to locking position, and means operated by the movement of the handle for controlling the circuit of said mechanism.

2. A controller provided with a shaft and a handle for operating said shaft, a device for locking said shaft against movement, an electric coil for operating said device, a substantially constant source of current for energizing said coil, and means controlled by the movement of the handle for making and breaking the circuit of said coil.

3. A controller provided with a shaft and a handle for operating said shaft, a device adapted upon movement in opposite directions for locking said shaft against movement, a solenoid adapted upon energization to move said device in one direction, means adapted upon energization of said solenoid for moving said device in the opposite direction, and contacts controlled by the movement of the controller handle for alternately making and breaking the solenoid circuit.

4. A controller provided with a shaft and a handle for operating said shaft, a device for locking said shaft against movement, a solenoid adapted to move said device in one direction, a solenoid adapted to move said device in the opposite direction, and means operated by the movement of the controller handle for controlling the circuits of said solenoids.

5. A controller provided with a handle, a device adapted upon movement in opposite directions for locking said handle against movement, and a dash pot device for retarding the movement of said mechanism in either direction.

6. A controller provided with a shaft and a handle for operating said shaft, a ratchet wheel adapted to be operated by said shaft, a pawl for engaging said ratchet wheel, an electric coil adapted to throw said pawl into operative position, a second pawl, and means for throwing said second pawl into operative position.

7. A controller provided with a shaft and a handle for operating said shaft, a ratchet wheel adapted to be operated by said shaft, an arm carrying two pawls, a solenoid adapted to operate said arm in one direction to throw one pawl into operative position with the ratchet wheel, and a second solenoid adapted to operate said arm in the opposite

direction for throwing the other pawl into operative position.

8. A controller provided with a shaft and a handle for operating said shaft, a ratchet
5 wheel adapted to be operated by said shaft, an arm carrying two pawls, a solenoid adapted to operate said arm in one direction to throw one pawl into operative position with the ratchet wheel, a second solenoid
10 adapted to operate said arm in one direction direction for throwing the other pawl into

operative position, and contacts operated by the movement of the controller handle for controlling the circuits of said solenoids.

In testimony whereof we have hereunto 15 set our hands.

JOHN F. MILLER.
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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
