A. J. LOGUIN.

CONTROLLER.

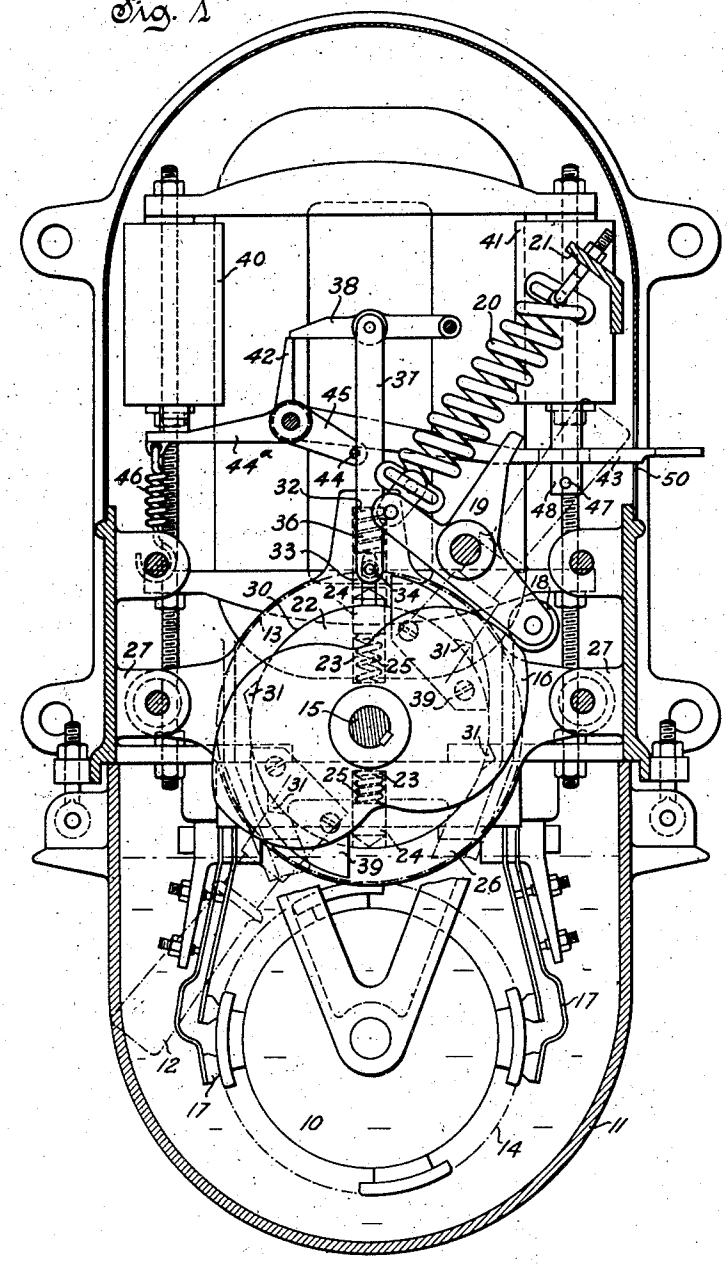
APPLICATION FILED MAR. 27, 1911.

1,048,419.

Patented Dec. 24, 1912.

4 SHEETS—SHEET 1.

Fig. 1



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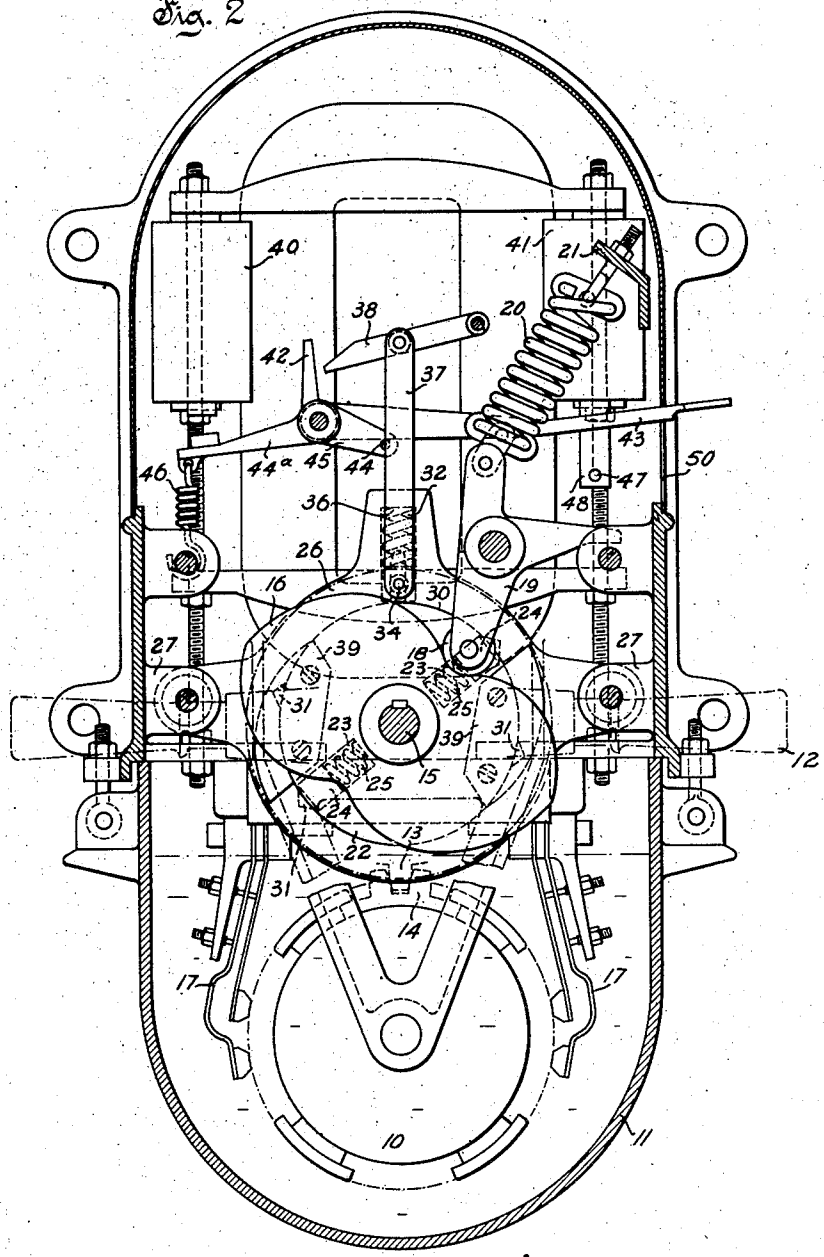
4 SHEETS—SHEET 2.

Fig. 2



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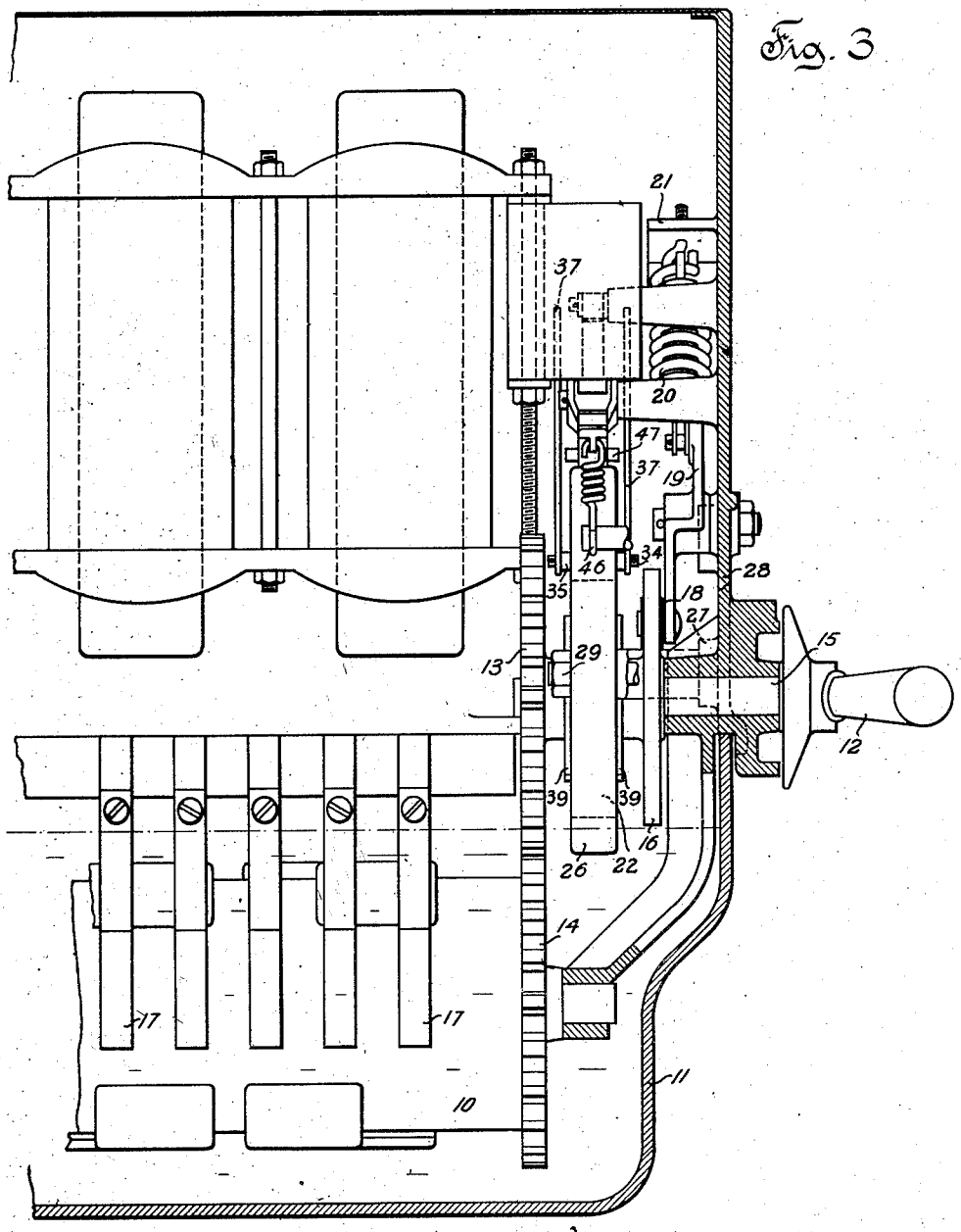
4 SHEETS—SHEET 3.

Fig. 3



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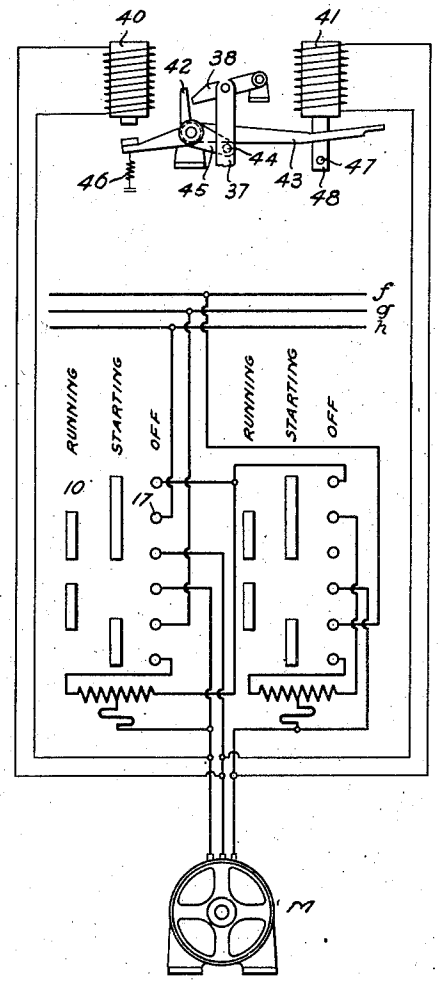
4 SHEETS—SHEET 4.

Fig. 4



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UNITED STATES PATENT OFFICE.

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CONTROLLER.

1,048,419. Specification of Letters Patent. Patented Dec. 24, 1912.

Application filed March 27, 1911. Serial No. 617,213.

To all whom it may concern:

Be it known that I, ALEXANDER J. LOGUIN, a subject of the Czar of Russia, residing at West Allis, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Controllers, of which the following is a full, clear, and exact specification.

This invention relates to controllers for electric motors, and more particularly to protective devices therefor.

In operating starting devices for some types of motors, especially potential starters for induction motors, it is often undesirable that the controller be moved backward from a running position to a starting position. To this end controllers have been designed which move directly from the running to the off position without passing through the starting positions. Controllers or potential starters have also been designed for preventing the controller from moving backward from an off position directly to a running position, and also for rendering it impossible for the operator to leave the controller in a starting position, arrangements being provided for automatically moving the controller backward to off position if it is released by the operator while it is in a starting position. It may also sometimes be desirable to have means whereby such a controller may be automatically moved forward from running position to off position in case abnormal conditions, such as "no-voltage" or an overload, arise.

It is the object of the present invention to improve controllers embodying the above enumerated desirable means for the various purposes set forth.

The various novel features of this invention will be described in the following specification, and particularly set forth in the appended claims.

The invention is illustrated in the accompanying sheets of drawings, in which—

Figure 1 is an end elevation, partly in section, of a potential starter equipped with my invention, the controller being shown in running position; Fig. 2 is a like view of the same controller in an off position; Fig. 3 is a side elevation, parts being in section, of that shown in Fig. 2; and, Fig. 4 shows a diagram of the electrical connections.

The details of the starting controller proper will not be described herein as they form no part of my present invention and are unnecessary to an understanding thereof.

A three-phase induction motor M is here shown and is supplied with current, through a suitable operating drum 10 and contact fingers 17 coöperating therewith, from the three-phase mains *f*, *g*, and *h*. The controller drum 10 is designed to make the proper connections for starting an electric motor in any desirable manner, the particular drum shown being designed for starting a polyphase induction motor by means of auto-transformer windings. The controller drum 10, which is immersed in oil in the oil tank 11, is moved by the operating handle 12 acting through gear wheels 13 and 14 and a shaft 15. The opposite halves of the controller drum are identical in structure. Each half coöperates in turn with each of the two sets of contact fingers 17 during successive operations of the controller, the sets of contact fingers being on opposite sides of the drum. The normal operation of the drum is continuously in the same direction, which is counter-clockwise in the arrangement shown.

Mounted on the shaft 15 is a cam 16 which is adapted to be engaged by a roller 18 secured in a spring-pressed lever 19, the spring 20 having its ends connected respectively to the lever 19 and a portion 21 of the controller casing. This arrangement forms a handle returning device which biases the movable member of the controller in one direction when on one side of running position and in another direction when in running position or on the other side thereof. Also mounted on and secured to the shaft 15 to revolve therewith is a disk 22. This disk is provided with a plurality of diametrically opposite radially extending holes 23 in each of which is located a plunger or reciprocatory member 24 normally pressed radially outward by a spring 25 which is located radially inward from or behind the plunger. Arranged concentric with and surrounding the disk 22 is a supporting frame 26 secured to lugs 27 formed integrally with the transformer casing 28 and held in a fixed position by nuts 29. This supporting frame is provided with a bored hole 30, the diameter of which is just sufficiently large to permit a free rotation of the disk 22, the periphery of which conforms to said bore in the supporting frame

26. The bored portion of the supporting frame 26 is provided with notches 31 marking the off and starting positions of the controller and which are adapted to receive the pointed ends of the plungers 24 when the controller is in off and starting positions. The supporting frame 26 also forms a stop by having a hole 32 therein which is adapted to receive the spring pressed plungers 24 normally to arrest the controller in running position. Also adapted to slide in said hole 32 is a spring-pressed block 33 having a pin 34 upon which is mounted a roller 35, the spring 36 being located behind the block 33 and normally tending to force said block radially inward toward the bored portion 30 to force the plunger 24 out of the hole 32. The spring 36 is sufficiently strong to overcome the spring 25 so that under certain abnormal circuit conditions when the controller is in running position, the block 33 will be forced by the action of the spring 36 against the plunger or reciprocatory member 24 forcing it out of the hole 32 to permit the controller to be moved forward into off position by the handle returning device. Secured to the pin 34 is a pair of links 37 which are pivotally secured to a latch 38. In running position as shown in Fig. 1 the latch 38 and block 33 are held against the tension of the spring by a trigger 42 which forms one end of an arm 43. The arm 43 is engaged by a pin 44 secured in a lever 44^a having a forked portion 45. One end of the lever 44^a forms an armature which is attracted and held to the core of a no-voltage magnet 40 against the tension of the spring 46 under normal operating conditions. The arm 43 is located in the path of a pin 47 on the core 48 of an overload magnet 41 and said arm is adapted to be actuated under certain conditions to be referred to presently to trip the trigger 42.

In Fig. 2 the controller is shown in off position with the reciprocatory members or plungers 24 engaging the notches 31 in the supporting frame 26. As the handle is moved in a clockwise direction the cam 16 and the disk 22 which are secured to the shaft 15 are rotated and by means of the roller 18 engaging the surface of the cam 16, the lever 19 is moved about its pivotal point stretching the spring 20 and continuously storing energy therein until it has reached a maximum, when the controller has reached its running position, as shown in Fig. 1. Also during the movement of the controller from the off to running position one of the cams 39, each comprising two sheet metal pieces fastened to opposite sides of the disk 22, engages the roller 35 and forces said roller 35 with its block 33 away from the bored portion of the supporting frame 26 against the tension of the spring 36. By the time the controller has reached a running position, one of the cams 39 will have raised the block 33 and latch 38 sufficiently so that the trigger 42 may pass under the latch 38 to hold said latch in its normal set operating position. The trigger will pass under said latch due to the weight of the arm 43 providing there is not an overload on the line. If there is an overload the arm 43 will be held up by the pin 47 so that it will be impossible for the trigger 42 to move under the latch 38 and therefore impossible for the controller to stop in a running position. When the controller has reached its running position the cam 39 which has just raised the latch 38, will be out of engagement with the roller 35, and due to the action of the spring 25, the plunger 24 will be forced into the stop opening 32 of the supporting frame 26.

If an overload occurs on the line, with the controller in running position as shown in Fig. 1, the core 48 will be drawn into the body of the overload magnet 41, the pin 47 engaging the arm 43 and forcing the trigger 42 out of engagement with the latch 38. Due to the stored energy in the spring 36, the block 33 is forced against the plunger 24, forcing the plunger out of the hole 32, and, due to the stored energy in the spring 20 the controller is dashed forward into off position. On the other hand, with the controller in running position, if no-voltage conditions arise, the spring 46 overcomes the diminished strength of the no-voltage magnet 40, drawing the lever 44^a away from the magnet and through the pin 44 forces the trigger 42 out of engagement with the latch 38 with the same result, namely, forcing the plunger 24 out of the hole 32 and permitting the handle returning device to move the controller forward into off position. It is therefore seen that the controller can be automatically moved to off position when in running position upon the occurrence of all abnormal conditions on the circuit. The trigger 42 can also be manually moved out of engagement with the latch 38, thereby permitting the controller to be moved into off position. This manual operation is effected by making the arm 43 long enough so that it will extend through an opening 50 in the casing of the controller.

It is evident that there may be many modifications in the precise form and arrangement herein shown and described, and I aim to cover all such modifications which do not involve a departure from the spirit and scope of my invention as set forth in the appended claims.

What I claim as new is:

1. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly

mounted spring-pressed plunger independent of said contact member.

2. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted reciprocatory member independent of said contact member.

3. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted reciprocatory spring-pressed member and a stationary coöperating member associated therewith.

4. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted spring-pressed plunger independent of said contact member, and means for releasing said movable contact member from said locking means.

5. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted spring-pressed plunger, and manually operated means for releasing said movable contact member from said locking means.

6. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted spring-pressed plunger independent of said contact member, and automatically operated means for releasing said movable contact member from said locking means.

7. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted spring-pressed plunger independent of said contact member, and means responsive to a reduction in voltage for releasing said movable contact member from said locking means.

8. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted spring-pressed plunger, and means responsive to an overload for releasing said movable contact member from said locking means.

9. In a controller, a movable contact member, an actuator therefor, and means independent of said actuator for locking said movable contact member in an operative position, said means including a revolubly mounted spring-pressed plunger independent of said contact member, and means responsive to abnormal circuit conditions for releasing said movable contact member from said locking means.

10. In a controller movable from running position to off position without passing through starting position, an actuator for moving said controller to a running position, and means independent of the actuator and including a revolubly mounted reciprocatory member for locking the movable member of said controller in running position.

11. In a controller movable from running position to off position without passing through starting position, an actuator for moving said controller into an operative position, means independent of said actuator and including a revolubly mounted reciprocatory member for locking the movable contact member of said controller in an operative position, and means for tripping the locking means.

12. In a controller biased in one direction when on one side of running position and in another direction when in running position or on the other side thereof, means for actuating said controller, and means independent of said actuating means and including a revolubly mounted spring-pressed member for locking said controller in running position.

13. In a controller biased in one direction when on one side of running position and in another direction when in running position or on the other side thereof, means for actuating said controller, and means independent of said actuating means and including a revolubly mounted spring-pressed member for locking said controller in an operative position, and means for tripping said locking means.

14. In a controller, contact fingers, a rotatable drum coöperating therewith, a shaft through which motion is given to said drum, a disk mounted on said shaft and having a plunger therein to lock said controller in an operative position, and means for unlocking said controller.

15. In a controller, contact fingers, a rotatable drum coöperating therewith, a shaft through which motion is transmitted to said drum, a member mounted on said shaft and having an independently movable plunger, a stop adapted to be engaged by said plunger to lock the controller in an operative position, and means for disengaging said plunger from said stop to permit said controller to be moved to another position.

16. In a controller, contact fingers, a ro-

tatable drum coöperating therewith, a shaft through which motion is transmitted to said drum, a member mounted on said shaft and having an independently movable plunger, a stop member adapted to be engaged by said plunger to lock the controller in an operative position, and means associated with said stop member for disengaging said plunger from said stop member to permit said controller to be moved into another position.

17. In a controller, contact fingers, a rotatable drum coöperating therewith, a shaft through which motion is transmitted to said drum, a spring-pressed plunger member mounted on said shaft, a stop member adapted to be engaged by said plunger to lock the controller in an operative position, and spring-pressed means within said stop member adapted under certain conditions to disengage said plunger from said stop to permit said controller to be moved into another position.

18. In a controller, contact fingers, a rotatable drum coöperating therewith, a shaft through which motion is transmitted to said drum, a disk mounted on said shaft and having an independently movable plunger, a stop member concentrically arranged relatively to said disk member and adapted to be engaged by said plunger to lock the controller in an operative position, and means for disengaging said plunger from said stop member to permit said controller to move into another position.

19. In a controller, contact fingers, a rotatable drum coöperating therewith, a shaft through which motion is transmitted to said drum, a disk associated with said shaft and having an independently movable plunger, a stop member adapted to be engaged by said plunger to lock the controller in an operative position, means for disengaging said plunger from said stop to permit said controller to be moved into another position, and means on said disk for moving said disengaging means to permit said plunger to hold the controller in an operative position.

20. In a controller, contact fingers, a rotatable drum coöperating therewith, a member having independently movable means, a stop member having independently movable means and adapted to be engaged by said independently movable means of said first member to lock the controller in an operative position, means on said first member for moving said independently movable means of said stop member to permit said independently movable means of said first member to hold the controller in an operative position, said movable means of said stop member being adapted to disengage said movable means of said first member from said stop member to permit the controller to be moved into another position.

21. In a controller, opposed spring-pressed members for locking and unlocking the controller in an operative position, means for setting said members to lock said controller in an operative position, and means for actuating said members to unlock the controller in said operative position.

22. In a controller, opposed spring-pressed members for locking and unlocking the controller in an operative position, manually operative means for setting said members to lock said controller in an operative position, an automatically operated means for actuating said members to unlock the controller in said operative position.

Milwaukee, Wis., March 22, 1911.

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

ALEXANDER J. LOGUIN.

Witnesses:
CHAS. L. BYRON,
ROB. E. STOLL.