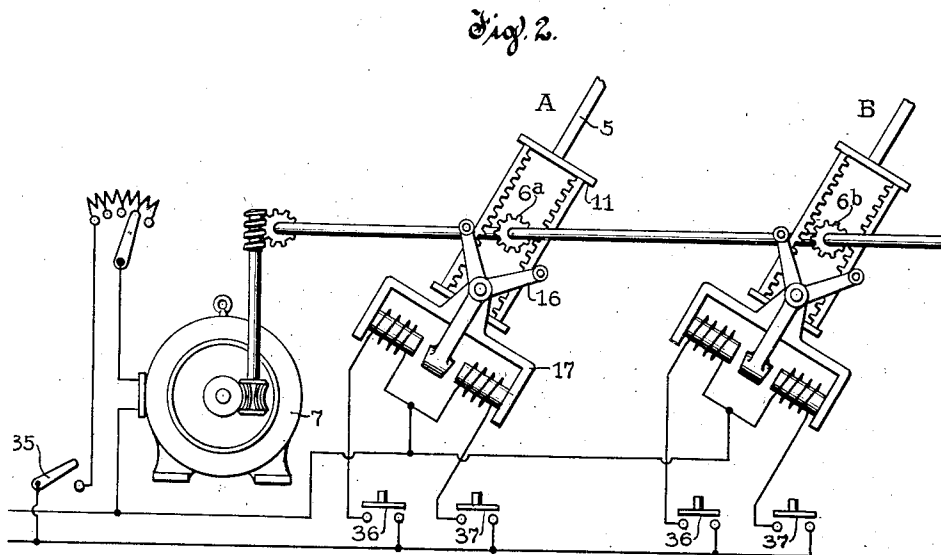
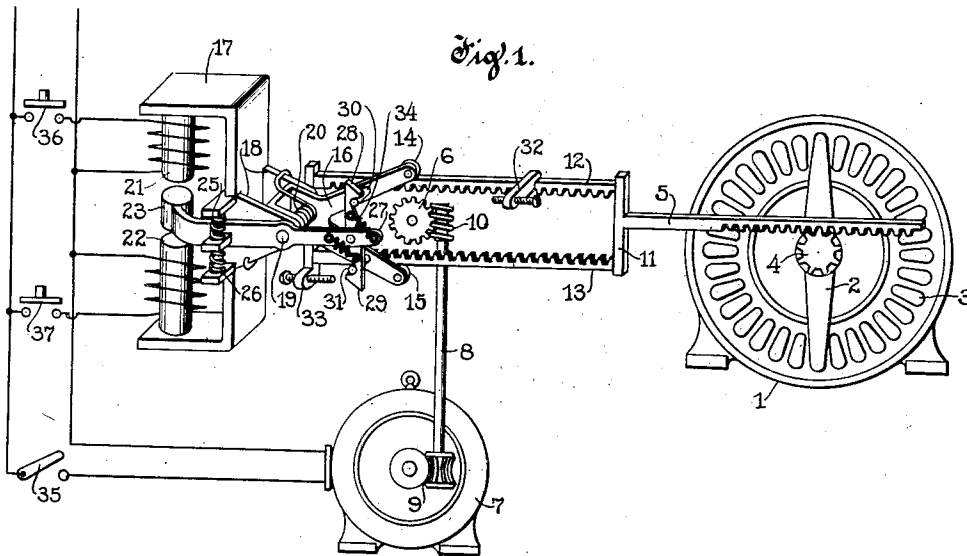


C. M. RICE.
CONTROLLING DEVICE.
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Witnesses
J. H. Johnson
H. Watson

Inventor
Charles M. Rice
By Frank H. Hubbard
Attorney

UNITED STATES PATENT OFFICE.

CHARLES M. RICE, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE CUTLER-HAMMER MFG. CO., OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

CONTROLLING DEVICE.

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To all whom it may concern:

Be it known that I, CHARLES M. RICE, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Controlling Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to improvements in controlling means for motor driven rheostats and is particularly designed for rheostats employed in theater dimming.

For theater dimming apparatus it is customary to provide a plurality, and often times a large number, of adjustable rheostats and to operate the same separately or in groups, as may be required to produce the desired lighting effects. In some instances the rheostats may be readily operated by hand but with a large number of rheostats it is advantageous to provide power operating means and control devices for selectively directing operation of the various rheostats, as desired.

This invention has among its objects to provide improved means for the aforesaid and other purposes.

A further object is to provide improved means whereby a plurality of rheostats or other devices may be readily connected to and disconnected from a common power device for simultaneous or independent operation.

A further object is to provide improved means for automatically disconnecting the several rheostats or other driven devices from the power operating devices upon movement of the former to predetermined limits.

Other objects and advantages of the invention will hereinafter appear.

The invention will now be more fully described in connection with the accompanying drawing, which illustrates a preferred embodiment thereof.

In the drawing, Figure 1 illustrates a single rheostat, a driving motor therefor and means for operatively connecting and disconnecting said elements; and, Fig. 2 exemplifies the utility of the mechanism shown in Fig. 1 where it is desired to operate a plurality of rheostats or other devices by a single motor.

Referring to Fig. 1 the same shows a rheostat 1 of a conventional form commonly employed in theater dimmers. It is circular in form and has a double-ended pivoted controlling arm 2 movable over a series of contacts 3 through the medium of a pinion 4 and a reciprocable rack 5. It should be understood, however, that the means hereinafter described is suitable for operating devices other than the rheostat shown.

The rack 5 is adapted to be driven, as hereinafter set forth, by a pinion 6 in turn operated by an electric motor 7 through suitable connections, such as a shaft 8 and sets of worm gearing 9 and 10.

As illustrated, the rack 5 is connected to an open rectangular frame 11 having two parallel rack bars 12 and 13 disposed on opposite sides of the pinion 6 and so mounted as to permit either of said rack bars to mesh with the pinion or both to be free therefrom. It will be apparent, therefore, that with the pinion 6 revolving continuously in one direction, the frame 11 affords means whereby movement may be imparted to the rheostat arm in either direction by selective meshing of the rack members with the pinion, or the driving connection may be interrupted by disengagement of both racks. The frame 11 is slidably supported between rollers 14 and 15 carried by the diverging arms of a pivoted bracket 16. This bracket constitutes part of an electromagnetic shifting mechanism for the frame 11 and is supported on a magnet frame 17 of such mechanism. The frame 17 has two parallel lugs 18 carrying a pin 19 and the bracket 16 is pivoted on said pin and normally held by a coil spring 20 in a position to maintain both rack members 12 and 13 out of mesh with the pinion 6.

Within the magnet frame 17 are two oppositely disposed magnets 21 and 22 (diagrammatically illustrated) having a common armature 23 comprising a lever fulcrumed on the pin 19 concentrically with the bracket 16 and centered between the two magnets by springs 25 and 26 carried by the magnet frame and bearing against opposite sides of said armature. The armature 23 is also provided with an extension 27 carrying pivoted pawls 28 and 29 to respectively engage pins 30 and 31 on the two arms of the bracket 16. These latching pawls and pins thus provide a connection between the armature 23 and the bracket 16 whereby the latter may be

rocked in either direction by attraction of the armature 23. Thus by energizing the magnet 21 to attract the armature 23 upwardly the bracket 16 would be rocked downwardly, forcing the rack member 12 into mesh with the pinion 6, while energization of the magnet 22 would attract the armature 23 downwardly and accordingly rock the bracket upwardly, thereby forcing the rack member 13 into mesh with the opposite side of the pinion. This provides for connection of the rheostat to the pinion for operation in either direction subject to release upon the deenergization of the electromagnet, for, as will be apparent, the springs 20, 25 and 26 cooperate to center the bracket 16 upon release of the armature 23 and thereby unmesh the racks. The pawls 28 also provide for disconnection of the frame 16 from the armature 23 whereby said bracket may be centered by spring 20 to disconnect the rheostat from the pinion 6 while the armature is still held in either extreme position. For this purpose the frame 11 is provided with adjustable lugs 32 and 33 adapted to engage and trip the latches 28 and 29 respectively so that the rheostat may be automatically freed from the pinion 6 upon operation in either direction to limits corresponding to the position of said lugs. Further, it will be observed that upon tripping of the latching pawls, as described, the release and complete clearance of the frame 11 from the pinion 6, and accordingly the cessation of movement of the rheostat, will be practically instantaneous. When either pawl is tripped, as described, it reengages its respective pin on the bracket 16 as soon as the armature 23 is released and restored to centered position, such automatic reengagement of the pawls being effected by springs 34 biasing the same toward latching position.

Referring now to the circuit diagram illustrated, it will be seen that the motor 7 may be started and stopped at will by a suitable switch 35 and that the magnets 21 and 22 may be selectively energized by suitable switches 36 and 37. As shown, these switches are of the push-button type and normally in open position whereby upon release thereof they effect deenergization of their respective magnets and in consequence cessation of operation of the rheostat. Thus the switches provide for operation of the rheostat in either direction to any desired degree and insurance against overtravel of the rheostat is provided independently by the mechanical tripping means.

Referring now to Fig. 2 the same shows two units A and B, each constructed as shown in Fig. 1 and both to be driven by the same motor, said motor in this instance driving two pinions 6^a and 6^b for the units A and B respectively. Each unit is pro-

vided with its own set of selective switches 36 and 37 whereby the two units may be operated independently of one another or simultaneously. Further, it will be observed that when the two units are operated simultaneously, they may be operated either in the same direction by depression of corresponding push-buttons or in opposite directions by depression of dissimilar push-buttons. Still further, the two units may be simultaneously operated in step or out of step; that is to say, they may be operated through the same or different ranges. Hence, since the two units illustrated are merely exemplary of a plurality of units which may be increased to any desired number, the many possibilities and advantages of the driving and control means illustrated will be readily apparent.

What I claim as new and desire to secure by Letters Patent is:

1. In combination, a circuit controller, operating means therefor including a rack and a pinion, one biased out of engagement with the other, means for effecting engagement of said rack and pinion and retaining the same in engagement for operation of said controller, and means for automatically freeing said biased member from restraint by said first-mentioned means upon operation of said controller to a predetermined limit.

2. In combination, a circuit controller, operating means therefor including a rack and a pinion, one biased out of engagement with the other, means for effecting engagement of said rack and pinion and retaining the same in engagement for operation of said controller and means for automatically freeing said biased member from said first-mentioned means upon an operation of said controller to a predetermined limit.

3. In combination, a circuit controller, a driving pinion therefor, an operative connection between said controller and said pinion including a rack member movable into and out of mesh with said pinion, and mechanical means to effect separation of said rack member from said pinion upon movement of said controller to a predetermined limit.

4. In combination, a circuit controller, a driving pinion therefor, an operative connection between said controller and said pinion including a reciprocable rack member to mesh with said pinion, and adjustable means to free said rack member from said former means automatically in any one of a number of predetermined positions of said controller.

5. In combination, a circuit controller having a reciprocable operating member, a driving pinion, said reciprocable member having a rack portion movable into mesh with said pinion, means for retaining said

rack portion in mesh with said pinion, and mechanical means acting upon movement of said controller to a given limit to automatically release said rack member from said pinion.

5 6. In combination, a circuit controller, a driving pinion therefor, an operative connection between said controller and said pinion including a reciprocable rack member to mesh with said pinion, means for retaining the same in mesh with said pinion, and adjustable means to free said rack member from said former means automatically in any one of a number of predetermined positions of said controller independently of said retaining means.

10 7. In combination, a circuit controller having a reciprocable operating member provided with rack teeth, a power-driven pinion, electrically controlled means for moving said rack member into mesh with said pinion and retaining the same in mesh therewith, means to automatically free said rack member from restraint by said former means in a predetermined position of said controller, and means to effect positive disengagement of said rack member from said pinion when freed from restraint.

20 8. In combination, a circuit controller, a reciprocable rack member for operating the same, driving means for said rack member normally disconnected therefrom, means for selectively connecting said member to said driving means for movement of the former in either direction, and means operating automatically under certain conditions to release said rack member from said driving means upon movement in either direction.

25 9. In combination, a circuit controller, a reciprocable operating member therefor having a rack portion, power operated means to be engaged by the rack portion of said reciprocable member for operation of said controller, said member being biased to disengage said driving means, means having a releasable connection with said member to move the same into engagement with said driving means and to maintain the same in such relation, and means associated with said member to trip said releasable connection for freeing said member from said driving means.

30 10. In combination, a circuit controller, a reciprocable operating member therefor having a rack portion, power driving means to be engaged by the rack portion of said member for moving the latter, electro-responsive means to effect engagement of said rack member with said driving means and to maintain such engagement, a releasable connection between said member and said electro-responsive means, and a part movable with said member to automatically break said connection in a predetermined position of said controller for interrupting

the driving connection of said member independently of said electro-responsive means.

11. In combination, a circuit controller, an operating member therefor having a rack portion, power operated means for driving said rack member in either direction for corresponding operation of said controller, electromagnetic means including a movable member in engagement with said rack member to selectively establish and maintain driving connection of the latter with said power operated means, said electromagnetic means and said movable member having a releasable connection, and means associated with said rack member to trip said connection upon movement of said controller in either direction to predetermined limits.

12. In combination, a circuit controller, a reciprocable operating member therefor having a double rack portion, a driving pinion disposed between the rack portions of said member to be engaged by either, means positioning said member normally out of engagement with said pinion, an electromagnetically operated device movable in opposite directions and normally biased in an intermediate position, means inherently connecting said member and said device in the normal positions thereof, and means associated with said member to break said connection after said device is moved in either direction and said member has traveled to a predetermined limit.

13. In combination, a circuit controller, a reciprocable and pivoted operating member therefor having rack portions, a driving pinion for said member, and means for effecting selective engagement of said rack portions with said pinion, for maintaining such engagement, and for insuring automatic disengagement thereof upon operation of said controller to a predetermined limit, said means comprising a pivoted member for controlling pivotal movement of said operating member, a pivoted member for controlling movement of said first mentioned pivoted member, a releasable connection between said pivoted members, and a member movable with said operating member to trip said connection.

14. The combination with a plurality of circuit controlling devices having movable elements and power means for moving said elements, of means associated with each of said devices for establishing a selective driving connection with said power means independently of the remaining devices or jointly therewith, and means associated with each of said devices for automatically interrupting the driving connection thereto independently of the driving connections to the remaining devices and after travel of its corresponding movable element to a limit adjustable relatively to the travel limits of the remaining movable elements.

15. In combination, a circuit controller, a reciprocable rack for operating the same, a pinion for driving said rack in either direction, a member to move said rack into and
 5 out of mesh with said pinion, means biasing said member to position said rack out of mesh with said pinion, an electrically controlled member to move said first mentioned member, means biasing said electrically controlled member to position said rack out of
 10 mesh with said pinion through the medium of said first mentioned member, releasable means automatically connecting said members when positioned by their respective biasing means, and means to automatically
 15 trip said connecting means upon travel of said rack to a predetermined limit for thereby positioning the same out of mesh with said pinion through the medium of said first mentioned member and its biasing means.
 20 16. In combination, a circuit controller, a reciprocable rack for operating the same, a pinion for driving said rack in either direction, a pivoted member to move said rack into mesh with said pinion, means biasing
 25 said member to position said rack out of mesh with said pinion, an electrically controlled pivoted member to move said first mentioned member, means biasing said electrically controlled member to position said
 30

rack out of mesh with said pinion through the medium of said first mentioned member, releasable means automatically connecting said members when the same are positioned
 35 by their respective biasing means and maintaining such connection upon movement of said first-mentioned member by said electrically controlled member, and adjustable means on said rack to automatically effect
 40 release of said connecting means upon travel of said rack to a predetermined limit for thereby positioning the same out of mesh with said pinion through the medium of said first-mentioned member and its biasing
 45 means.

17. In combination, a circuit controller, a reciprocable operating member therefor having spaced rack portions, a power driving pinion intermediate said rack portions, and means including a pivoted frame slidably
 50 supporting said member for selectively effecting the meshing of either of said rack portions with said pinion.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.
 55

CHARLES M. RICE.

Witnesses:

L. A. WATSON,
 TEKLA BARB.