L. L. TATUM.

CONTROLLING DEVICE.

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1,234,824.

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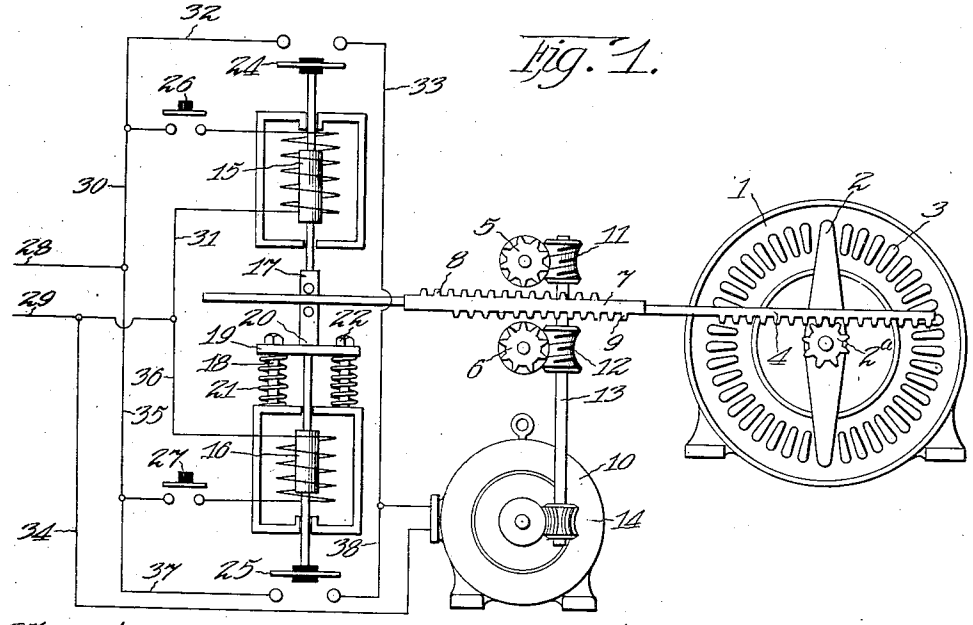


Fig. 1.

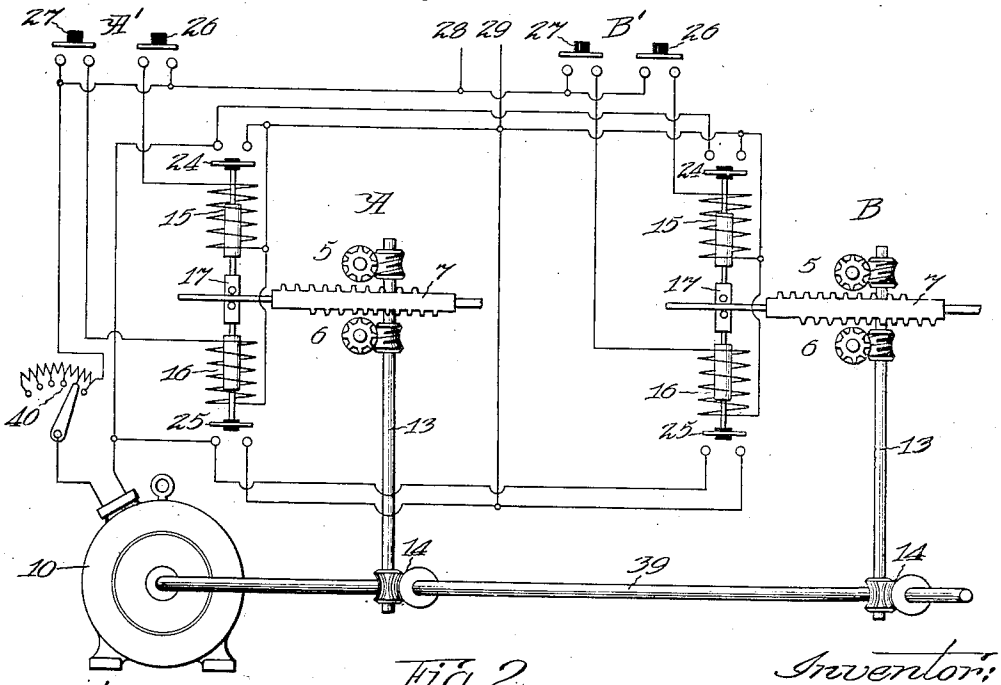


Fig. 2.

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CONTROLLING DEVICE.

1,234,824. Specification of Letters Patent. Patented July 31, 1917.

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To all whom it may concern:

Be it known that I, LEWIS L. TATUM, 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.

My invention relates to improvements in automatic controlling devices.

My invention is particularly adapted for controlling theater dimmers and other circuit regulating devices having movable elements which it is desired to operate in either direction in varying degrees. It should be understood, however, that my invention is not limited in its application to such devices.

The various objects and advantages of my invention will be hereinafter clearly and fully set forth.

For the purpose of disclosing the nature and characteristic features of my invention I have schematically illustrated in the accompanying drawings certain embodiments thereof. My invention, however, is not limited to the specific embodiments thereof selected for the purpose of illustration.

In the accompanying drawings:—

Figure 1 is a schematic view showing a controller suitable for operating a single device or a group of devices connected to operate in unison, and

Fig. 2 is a schematic view showing a controller for a plurality of separate devices.

Referring to Fig. 1, I have schematically shown the dimmer plate 1 of a well known construction. This plate has a double ended controlling arm 2 movable over a circular set of contacts 3. The arm 2 is adapted to be moved in a well known manner by a rack member 4 meshing with a pinion 2^a on the hub of the arm 2. As is well understood in the art a plurality of these plates may be assembled in a bank with a common shaft connecting the arms 2 thereof whereby the several arms may be operated in unison. It may therefore be assumed that there is but a single plate or a plurality of plates banked and connected to be operated in unison as just mentioned. In the past such devices have been operated by hand through the medium of levers secured to the rack members 4.

I shall now describe the controller shown for automatically operating the rack member in either direction and to any predetermined degree to obtain the desired movement of the controlling arm or arms 2. This controller includes two pinions 5 and 6 between which is disposed an extension 7 of the rack member 4. The pinions revolve in the same direction. The portion 7 of the rack member is provided on opposite sides with toothed rack portions 8 and 9 adapted to mesh with the pinions 5 and 6 respectively. As will later be described the portion 7 is normally maintained in a position with both of the rack portions 8 and 9 out of engagement with the pinions 5 and 6 but is movable in opposite directions from said normal position to cause either rack portion to engage its respective pinion. Obviously with the pinions revolving in the same direction the member 7 may be thrown into engagement with one pinion for moving the controller arm 2 in a clock wise direction and into engagement with the relatively opposite side of the other pinion for moving said arm in a counter clock wise direction. The degree of movement of the arm of course depends upon the length of time that the rack is held in engagement with the pinions or upon the length of time the pinions are revolved. The rack portions 8 and 9 are proportioned relatively to the maximum angular movement desired of the controlling arm so that they will disengage the pinions at the limits of movement of the arm 2. This obviates the necessity of providing limiting devices for of course the movement of the arm ceases as soon as the rack portions disengage the pinions.

In practice the pinions 5 and 6 may be operated continuously from any suitable source of power or may be operated only when operation of the controlled device is desired. In practice especially where intermittent op-

eration of the pinions 5 and 6 is desired I prefer to operate the same by an electric motor 10. Of course the pinions may be geared to the motor in any preferred way. As illustrated the pinions are driven through worm gearing 11 and 12 respectively in turn operated by a shaft 13 connected to the motor shaft through worm gearing 14.

For moving the rack member into engagement with either the pinion 5 or 6 to secure operation of the arm 2 in the desired direction, I have provided two small solenoids 15 and 16. The plungers of these solenoids are connected by a link 17 which supports the free end of the rack member, said free end of the rack member being free to slide longitudinally in said link. The solenoids 15 and 16 when energized pull in opposite directions. The solenoid 15 when energized pulls the rack member upwardly throwing the rack portion 8 thereof into engagement with pinion 5, while the solenoid 16 pulls the rack member downwardly, throwing the rack portion 9 thereof into engagement with the pinion 6. As before stated I desire to normally hold the rack member out of engagement with both pinions 5 and 6. This may be accomplished in various different ways. As illustrated I have provided on the frame of the solenoid 16 two upwardly extending rods 18 upon which is slidably mounted a cross member 19 adapted to abut against a portion 20 of the link 17. Surrounding the rods 18 are coil springs 21 tending to force the cross member 19 upwardly against stops 22 on said rods. This of course tends to raise the link 17 and accordingly move the rack member toward the pinion 5. The stops 22 however are so adjusted as to limit the upward movement of the cross member to such an extent as to prevent the rack from being moved into engagement with the pinion 5 but permitting sufficient movement of said cross member to free the rack from the pinion 6. Thus the rack member is normally held out of engagement with both pinions.

The engagement between the rack member and the operating pinions being controlled by the solenoids 15 and 16 it is obvious that the controlled device may be regulated at will by merely energizing one or the other of the solenoids and starting the driving motor. As before stated, however, the pinions 5 and 6 may be continuously operated if so desired. Where continuous operation of the pinions is not required various different provisions may be made for controlling the motor. In practice, however, I prefer to provide means whereby the motor and solenoids may be controlled by common switches and I have illustrated such arrangement.

In the arrangement illustrated I have provided motor controlling switches 24 and 25 adapted to be actuated by the solenoids 15 and 16 respectively. Both of these switches are normally open and each is adapted when closed to complete the motor circuit. The switch 24 is closed upon energization of the solenoid 15 to throw the rack member into engagement with the pinion 5, while the switch 25 is adapted to be closed upon energization of the solenoid 16 to move the rack member into engagement with pinion 6. For controlling the circuits of the solenoids 15 and 16 I have provided normally open push buttons 26 and 27, the former controlling solenoid 15 and the latter controlling solenoid 16.

I shall now describe the manner of controlling the solenoids and motor to secure the desired operation of the dimmer controlling arm 2, at the same time clearly describing the circuit connections shown. Current is supplied to the solenoids and motor from supply lines 28 and 29. Assuming now that it is desired to operate the controller arm 2, through the medium of the pinion 5, push button 26 is operated. This closes a circuit from main line 28 by conductor 30 through the push button 26 and the operating winding of solenoid 15 by conductor 31 to line 29. Solenoid 15 thereupon responds, throwing the rack member into engagement with pinion 5. At the same time it closes switch 24, completing a circuit from main line 28 by conductors 30 and 32 through switch 24 by conductor 33 through the motor windings by conductor 34 to line 29. The motor is thus set in operation, thereby revolving the pinion 5 and moving the controller arm 2 in a direction corresponding to the direction of the rotation of the pinion 5. The motor will remain in operation and continue to move the controller arm 2 until the push button 26 is released. Upon release of the push button 26 the solenoid 15 is deënergized allowing the rack member to return to normal position and opening the switch 24 to interrupt the motor circuit.

Assuming now that it is desired to move the arm 2 in the opposite direction, the push button 27 is closed. This completes a circuit from line 28 by conductor 35 through push button 27 and the operating winding of solenoid 16 by conductor 36 to line 29. Solenoid 16 thereupon responds, moving the rack member into engagement with the pinion 6. At the same time it closes switch 25 which completes the motor circuit from line 28 by conductors 35 and 37 through switch 25 by conductor 38 to conductor 33 and thence through the motor windings as already traced. The motor is thus again set in operation but this time operates the rack

member and arm 2 through the medium of pinion 6 and accordingly in an opposite direction to that previously described. The motor will remain in operation until the push button 27 is released to deënergize solenoid 16 whereupon the rack member will return to normal position and the switch 25 will open interrupting the motor circuit.

It will thus be seen that the controlled device may be operated in either direction by merely pressing one of the push buttons in accordance with the results desired and that the degree of movement of the controlled device is determined by the length of time that the push buttons are held closed. It will further be observed that the push buttons may be arranged at any convenient point either in proximity to the controlled device or remote therefrom.

In practice a plurality of separate devices or separate banks of devices may be operated by a single motor as exemplified in Fig. 2. In this figure I have shown two sets of driving pinions 5 and 6, said sets being designated as A and B. Both of these sets of pinions are geared in the manner shown in Fig. 1 to a common shaft 39 driven by motor 10. Each set is adapted to operate an independent rack member which it may be assumed operate separate devices such as the device shown in Fig. 1. In conjunction with each set of driving pinions I have provided a controller of the same type as that shown in Fig. 1, the controllers being designated as A′ and B′. The controllers A′ and B′ are entirely independent except for cross connections between their motor controlling switches 24 and 25. The switches 24 of the two controllers are connected in parallel and the switches 25 are also connected in parallel. These connections insure the motor being maintained in operation so long as any one of the control push buttons is closed.

With the arrangement shown in Fig. 2 various results may be obtained. The two controllers may be operated at different times entirely independently of one another to afford entirely independent operation of the controlled devices. On the other hand the controlled devices may be operated in unison by simultaneously operating corresponding push buttons of the two controllers. Still further, the controlled devices may be simultaneously operated in opposite directions by pressing non-corresponding buttons of the two controllers and this with but a single driving motor. Accordingly it will be seen that any desired operation of the controlled devices may be readily obtained by pressing the different control buttons.

While I have only shown provisions for operating two separate devices from the same motor it should be understood that a single motor may be used for operating a greater number of separate devices. It should also be understood that the speed of the motor might be regulated by any suitable means for regulating the speed of the controllers or varying the speed of the controllers from time to time as desired. For example such a speed regulation might be obtained by an armature regulating rheostat 40 such as that illustrated in Fig. 2 or by any other suitable means.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a controller for a plurality of rheostats to be operated individually or collectively, the combination with a common driving motor for the rheostats, of individual and releasable rheostat driving connections and individual controllers for the rheostats each adapted to set and release the driving connection of its respective rheostat and to start and stop said motor, said controllers being interconnected to subordinate each to the remainder thereof for stopping said motor.

2. In a controller for a plurality of rheostats to be operated individually or collectively, the combination with a common driving motor for the rheostats, of individual and releasable rheostat driving connections and individual electro-responsive controllers for the rheostats each adapted when energized to establish the driving connection of its respective rheostat and to start said motor and when deënergized to effect release of such driving connection and to stop said motor and interconnections for said controllers rendering each subordinate to the other in stopping said motor.

3. In a controller for a plurality of rheostats to be operated individually or collectively, the combination with a common driving motor for the rheostats, individual rheostat driving connections each releasable and reversible, individual controllers for the rheostats, each adapted to set the driving connection of its respective rheostat for reverse operations thereof selectively by said motor and to start and stop said motor and interconnections between said controllers rendering each subordinate to the remainder for stopping said motor.

4. In a controller for a plurality of rheostats to be operated individually or collectively, the combination with a common driving motor for the rheostats, individual rheostat driving connections each releasable and reversible, individual electro-responsive controllers for the rheostats, each being responsive to set the driving connection of its respective rheostat for reverse operations se-

lectively and to start and stop said motor and being adapted when deënergized to release such driving connection and stop said motor and interconnections between said controllers rendering each subordinate to the remainder for stopping said motor.

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

LEWIS L. TATUM.

Witnesses:
WALTER E. SARGENT,
FRANK H. HUBBARD.