M. M. GOLDENSTEIN,

RHEOSTAT.

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1,280,713.

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Fig. 1.

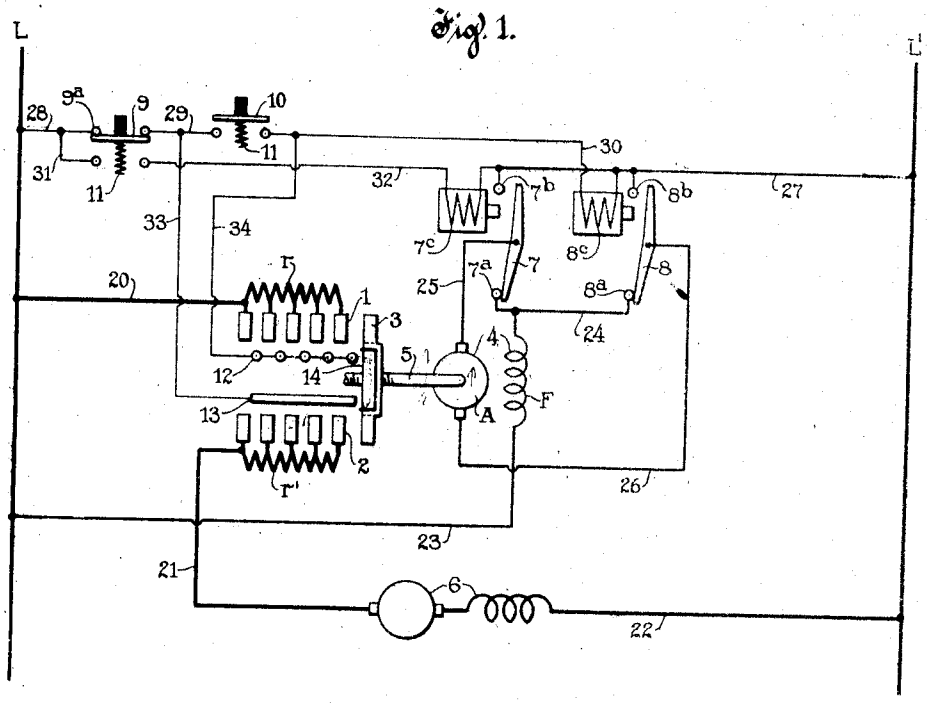
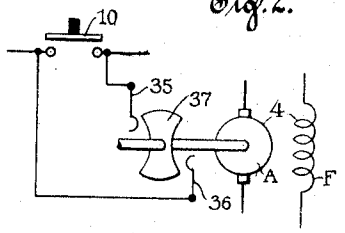


Fig. 2.



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RHEOSTAT.

1,280,713. Specification of Letters Patent. **Patented Oct. 8, 1918.**

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To all whom it may concern:

Be it known that I, MAURICE M. GOLDENSTEIN, 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 Rheostats, 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 rheostats and other circuit controllers provided with contact members movable into engagement with any one of a number of coöperating contacts.

In such devices it is desirable to have the movable contact member rest squarely on the selected contact or contacts, and this invention has, among its objects, to provide means to insure this result.

Various additional objects and advantages will hereinafter appear.

The invention is susceptible of embodiment in various different forms, one of which, together with a modification thereof, is illustrated in the accompanying drawing.

In the drawing,

Figure 1 is a diagrammatic view of an electrically operated rheostat used for controlling an electric motor; and

Fig. 2 is a diagrammatic view of a modification of the rheostat controlling means shown in Fig. 1.

The rheostat selected for the purpose of illustration is of the cross-head pilot motor operated type. It comprises two series of parallel contacts 1 and 2 over which is movable a cross-head bridging contact 3 operated by a pilot motor 4 through suitable means, such as a screw shaft 5. This rheostat is illustrated as controlling the continuity of the circuit of a motor 6 and also as controlling resistances r and r' in said motor circuit. In connection with the resistances r and r' it may be assumed that the same are employed for regulating the speed of the motor 6 and that the cross-head is adapted to be checked in any one of its numerous positions to effect the desired speed regulation.

The pilot motor 4 is reversible to move the cross-head in either direction, and while said motor may be of any preferred type, it has been shown as provided with an armature A and a series of field winding F. This motor is provided with two controlling switches 7 and 8 for starting the same and determining the direction of operation thereof.

The switches 7 and 8 normally stand in positions to engage contacts 7^a and 8^a respectively and are movable from such positions to engage contacts 7^b and 8^b respectively. The switches are independently operable, the switch 7 being provided with an operating winding 7^c and the switch 8 with an operating winding 8^c. The windings 7^c and 8^c are controlled by push-buttons, or other suitable switches 9 and 10 respectively, whereby the motor is started in either direction at will. It may be assumed that the push-button 9 effects operation of the switch 7 to start the motor in a direction to include the motor resistances and that the push-button 10 effects operation of the switch 8 to reverse the pilot motor, thereby excluding the motor resistances.

The push-buttons 9 and 10 are preferably biased to the positions illustrated, as by means of springs 11, whereby upon release thereof they will tend to arrest the operation of the pilot motor 4 and accordingly the rheostat cross-head. Also, the push-button 9 is preferably provided with a pair of up contacts 9^a bridged thereby when in normal position. These contacts are in series with the push-button 10 so that when the push-button 9 is depressed it disconnects the former from circuit. This provides an electrical interlock between the push-buttons which insures against interference of the switches 7 and 8. Also, this interlock has an additional function, which will hereinafter appear.

The aforesaid means thus provide for operation of the rheostat cross-head in either direction at will and for arresting the cross-head in any desired position. With such means, however, considerable care would have to be exercised in order to stop the cross-head squarely on the desired contacts, but the means which will now be described insures against stopping the cross-head except when centered on one of the pairs of contacts 1 and 2.

This means, as shown in Fig. 1, includes a series of contacts 12 and a contact strip 13 associated with the rheostat. These contacts are arranged to be engaged by a bridging piece 14 carried by the cross-head 3 but insulated therefrom. The arrangement is such that as the cross-head travels over the contacts 1 and 2 the contact piece 14 successively bridges the contacts 12 with the contact strip 13 to establish a shunt around the push-button 10. The contacts 12, however, are so arranged as to be engaged by the contact 14 only during the movement of the cross-head between centered positions on adjacent pairs of contacts 1 and 2. In other words, the contacts 12 are disengaged by the cross-head contact 14 and circuit between the same and the contact strip 13 is interrupted whenever the cross-head 3 is centered on any pair of contacts 1 and 2.

As will now be apparent whenever the push-button 10 is operated to energize the switch 8 and thereby start the cross-head to the left the contact 14 on the cross-head will successively make and break the shunt around said push-button to intermittently establish a maintaining circuit for the switch. Accordingly, should the push-button be released while said maintaining circuit is established the switch 8 will remain energized until said circuit is interrupted by the cross-head. Also, it will be apparent that with the arrangement of contacts specified the cross-head will interrupt the maintaining circuit immediately upon centering upon the pair of contacts 1 and 2 with which it engages when the push-button 10 is released. In other words, whenever the push-button 10 is released with the cross-head off center on any pair of contacts 1 and 2 the maintaining circuit controlled by the cross-head will cause continued advance of said cross-head, until it rests squarely on such contacts.

The means described also provides for centering of the cross-head on its contacts when moved in the reverse direction but in a slightly different manner. When the push-button 9 is operated to effect reverse operation of the cross-head it breaks circuit between the contacts 9^a, thereby interrupting the circuit through the push-button 10 and through the winding of switch 8, as aforesaid. Thus all possible interference of the contacts 12 and 13 with the reverse operation of the pilot motor is eliminated and the pilot motor will operate to move the cross-head to the right so long as the push-button 9 is held depressed. When, however, the push-button 9 is released it deënergizes the switch 7 to disconnect the pilot motor from circuit and at the same time again bridges contacts 9^a. Accordingly if the cross-head is not centered on one pair of contacts 1 and 2 it will bridge one of the contacts 12 with the contact strip 13 and thereby parallel the push-button 10 and energize the switch 8. The switch 8 will thereupon respond to start the pilot motor in the reverse direction and return the cross-head 3 to the left until it is centered upon the nearest pair of contacts 1 and 2. Thus the only difference in the centering operation under reverse operations of the cross-head is that in one case the cross-head is automatically advanced to centered position while in the other case it is automatically returned to centered position.

More specifically describing the circuit connections the same are as follows: The circuit controlled by the rheostat extends from line L by conductor 20 through said rheostat when in circuit closing position, by conductor 21 through the motor 6, by conductor 22 to line L'.

The pilot motor circuit as established by the switch 8 extends from line L by conductor 23, through the field winding F, by conductor 24 through the contacts 7^a of switch 7, by conductor 25 through the motor armature, by conductor 26 through the contacts 8^b of switch 8, by conductor 27 to line L'. The pilot motor circuit as established by the switch 7 extends as aforesaid to conductor 24 thence through the contacts 8^a of switch 8, by conductor 26 through the motor armature in a reverse direction to that previously described, by conductor 25 through the contacts 7^b of switch 7 and thence by conductor 27 to line L'.

The energizing circuit of the switch 8 extends from line L by conductor 28 through the up contacts of push-button 9, by conductor 29 through push-button 10, by conductor 30 through the winding 8^c to conductor 27 and line L'. The energizing circuit of the switch 7 extends from line L by conductors 28 and 31 through the down contacts of push-button 9, by conductor 32 through winding 7^c to conductor 27 and line L'. The shunt around the push-button 10 comprises a lead 33 from the contact strip 13 to conductor 29 and a lead 34 from the contacts 12 to conductor 30.

Referring now to Fig. 2, the same shows a modified form of shunting device for the push-button 10. This device comprises stationary contacts 35 and 36 and a revoluble bridging contact 37. The contact 37 is so constructed that when the same is revolved it will make and break circuit between the contacts 35 and 36 and thereby make and break the shunt around the push-button 10. Further said contact 37 is suitably connected to the pilot motor to be operated thereby and its contact surfaces are so proportioned as to maintain circuit between contacts 35 and 36 only during successive movements of the rheostat between adjacent pairs of contacts 1 and 2. It breaks circuit whenever the

cross-head is centered on any pair of contacts 1 and 2. Accordingly it will function in the same manner and accomplishes the same result as the contact buttons 12 and contact strip 13 of Fig. 1. Of course, in practice, the contact 37 may be connected to the pilot motor to give any desired speed ratio therebetween.

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

1. In combination, an adjustable member, power operating means therefor, and control means for the latter to effect adjustment of the former in opposite directions to different degrees, said means including control parts associated with said member and unidirectional starting means for said power operating member responsive to said control parts to insure against arrest of said adjustable member following its movement in either direction except in predetermined positions.

2. In combination, an adjustable rheostat, an electric driving motor therefor, and control means for said motor to effect reverse operations thereof for adjustment of said rheostat in reverse directions and to different degrees, said means including means associated with said rheostat to effect unidirectional operation of said motor for prevention of the arrest of said rheostat between predetermined positions of rest.

3. In combination, an adjustable member, power operating means for effecting adjustive movement thereof in opposite directions and to different degrees, and means acting upon said power operating means under certain conditions for automatically insuring uni-directional positioning movement of said member following adjustive movement thereof in either direction.

4. In combination, an adjustable rheostat, an electric driving motor therefor, separate electro-responsive switches for starting said motor in opposite directions for reverse adjustments of said rheostat and to degrees varying with the duration of energization of the selected switch and means associated with said rheostat to control a certain one of said switches for operation of said motor to insure against arrest of said rheostat except in predetermined spaced positions regardless of its direction of adjustment.

5. In combination, an adjustable rheostat, an electric driving motor therefor, separate electro-responsive switches for starting said motor in opposite directions for reverse adjustments of said rheostat, means controlling said switches to direct the operation of said motor and adjustment of said rheostat and means associated with said rheostat to energize a certain one of said switches independently of said directing means when the rheostat is in any other than predetermined spaced positions of rest to thereby insure against arrest of said rheostat except in one of such positions, said directing means rendering said last mentioned means ineffective during energization of the other of said switches to prevent interference of said switches.

6. In combination, an adjustable member, power operating means therefor, and control means for the latter to effect adjustment of the former in opposite directions and to different degrees, said means including control parts associated with said member and starting means for said power operating means responsive to said control parts upon movement of said adjustable member in either direction to provide uni-directional movement thereof for insuring against arrest of said member except in predetermined positions.

7. In combination, an adjustable member, power operating means for moving the same in opposite directions to varying degrees, control means for said operating means, and means associated with said member effective automatically under certain conditions to actuate said control means for initiating movement of said member through said operating means.

8. In combination, an adjustable member, power operating means for effecting adjustment thereof to different degrees, and means associated with said member and effective automatically under certain conditions to initiate action of said operating means for positioning of said member.

9. In combination, an adjustable member, power operating means for effecting adjustment thereof in opposite directions and to different degrees, electro-responsive control means for said operating means, and a circuit controller therefor operating in synchronism with said power means and effective automatically under certain conditions to actuate said control means for initiating movement of said power means.

10. In a controller, in combination, a plurality of contacts, an electromagnetically operated member operable in opposite directions to be arrested in engagement with any selected one of said contacts, means operating with said member to alternately make and break a power circuit therefor, said circuit, when completed, effecting operation of said device in a predetermined direction and means insuring against interference of said former means with the reverse operation of said member.

11. In a controller, in combination, a plurality of contacts, an electromagnetically operated member, means for effecting operation of said member in either direction and for arresting the same in engagement with any one of said contacts, and means operating during movement of said member to alternately make and break a power cir-

cuit therefor, said power circuit, when completed, effecting movement of said member in one direction for the purpose set forth, and said first mentioned means, when operated to reverse the movement of said member, rendering said second mentioned means temporarily ineffective.

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

MAURICE M. GOLDENSTEIN.

Witnesses:

F. S. WILHOIT,

H. L. TRAUTMAN.