H. W. CHENEY.

CONTROLLING DEVICE.

APPLICATION FILED SEPT. 13, 1909.

992,851. Patented May 23, 1911.

Fig. 1

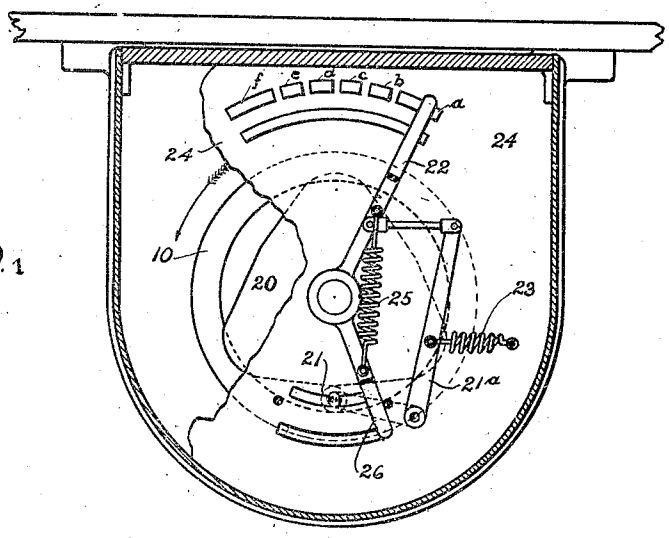
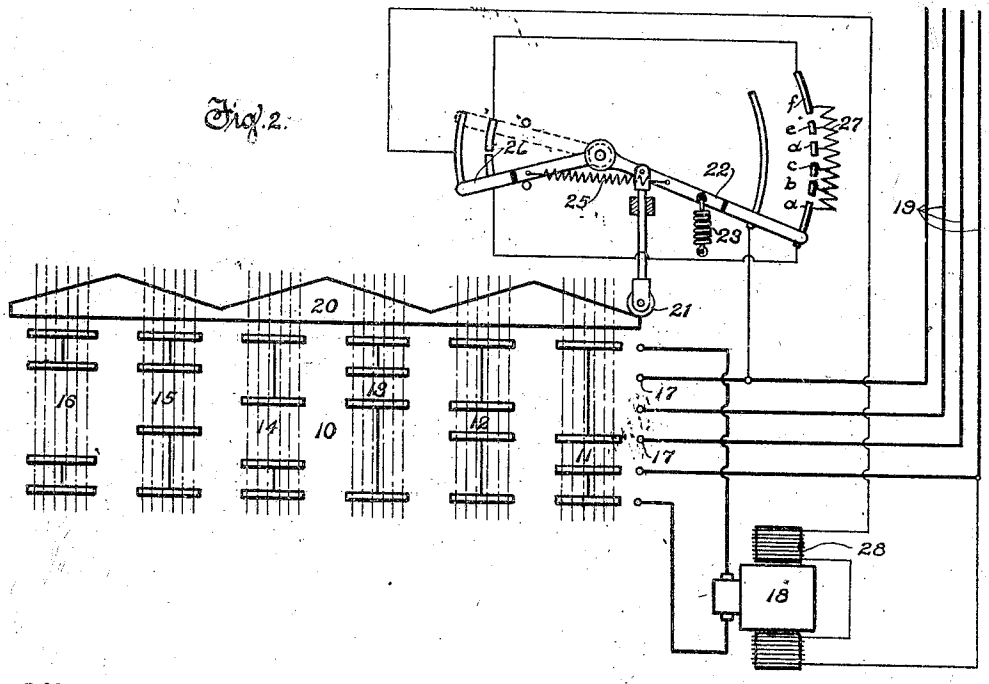


Fig. 2.



Witnesses

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CONTROLLING DEVICE.

992,851. Specification of Letters Patent. Patented May 23, 1911.

Application filed September 13, 1909. Serial No. 517,488.

To all whom it may concern:

Be it known that I, HERBERT W. CHENEY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Controlling Devices, of which the following is a full, clear, and exact specification.

My invention relates to controllers.

There often arise cases where a variable resistance is to be repeatedly cut in and out. In some of these it is necessary that only the cutting in or only the cutting out of the resistance be gradual, it being permissible for the cutting out or the cutting in respectively to be done quickly. For instance, in multiple voltage controllers it is generally desirable to cut resistance gradually into the motor field circuit to raise the motor speed while the armature connections are unchanged, and to cut such resistance quickly out as the motor armature is connected to mains of a higher voltage. In the ordinary form of rheostatic controller, in order to obtain a cutting in or cutting out of the resistance after the rheostat arm has been moved to cut the resistance gradually out or in it is necessary to move the rheostat arm over the entire set of contacts.

It is the object of my present invention to avoid the necessity for such movement. This is accomplished by providing an arrangement whereby after the variable resistance has been fully cut in or out, a switch is thrown to change the line connection from one end of the resistance to the other, thus cutting the entire resistance out or in as the case may be. The next operation of the rheostat arm to cut resistance in or out is in the opposite direction to its previous movement to obtain the same result.

My invention is adapted for many uses, but by way of illustration, I have shown it in connection with a multiple voltage controller.

The various novel features of my invention will appear from the description and drawings, and will be particularly pointed out in the claims.

Figure 1 is a bottom view of a controller embodying my invention, the bottom plate of the casing being removed and some parts being broken away; and, Fig. 2 is a diagram showing the plan of operation.

The controller drum 10 has a number of sets of contacts 11, 12, 13, 14, 15, and 16, which coöperate with stationary contact fingers 17 to connect the armature 18 of a motor to be controlled between different sets of the multiple voltage mains 19. On the shaft of the controller, preferably at the lower end thereof, is a cam 20 which cooperates with a roller 21 on a bell-crank lever 21^a to move a rheostat arm 22 over a set of contacts *a*, *b*, *c*, *d*, *e*, and *f*. The arm 22 is biased in a clockwise direction by a spring 23. This arm is preferably mounted on a plate 24 near the bottom of the controller, and its pivotal point is in line with the controller shaft. If desired, the arm may be loosely pivoted on such shaft. In Fig. 1 the plate 24 is partly broken away to show the drum 10 and cam 20. The end contacts *a* and *f* are longer than the intermediate contacts, and when the rheostat arm 22 is moved to the outer end of either the contact *a* or the contact *f* it moves a spring 25 over a center line and causes it to snap a double throw switch 26 from one position to the other. This movement of switch 26 may be accomplished in other ways if desired, as for example by employing a cam action.

The parts are shown with the controller in off position. When the controller is moved forward, or in the direction shown by the arrow in Fig. 1, into the first position the controller drum connects the motor armature 18 between those of the multiple voltage mains 19 which have the lowest voltage, and cam 20 and roller 21 move the arm 22 to the counter-clockwise end of the contact segment *a*. As the controller is moved farther forward, the armature connections are maintained the same, while by means of the cam 20, roller 21, and bell crank lever 21^a the arm 22 is moved successively into engagement with the contacts *b*, *c*, *d*, *e*, and *f* to cut the resistance 27 gradually into circuit with the field magnet 28 of the motor. If the controller is moved farther forward after the arm 22 has reached the clockwise end of the contact segment *f*, the motor armature circuit is broken at the controller drum, the arm 22 is moved to the counter-clockwise end of the contact segment *f* to move the spring 25 over its dead center and snap the switch 26 from the position shown in full lines to the position shown in dotted lines, thus cutting the resistance 27 entirely out of

the field circuit by changing the connections of the field magnet circuit from one end of such resistance to the other, and the armature is connected by the controller drum to the mains of the next higher voltage. As the controller is moved forward from this point the cam 20 allows the spring 23 to move the arm 22 in a clockwise direction into engagement with the contacts *e*, *d*, *c*, *b*, and *a* successively, thus again cutting the resistance 27 gradually into the field circuit. This time, however, the movement which cuts this resistance into circuit is in the opposite direction to what it was in the preceding case. If the forward movement is continued to bring the arm 22 in a clockwise direction past the counter-clockwise end of the segment *a*, the armature circuit is again broken, the switch 26 is moved from its dotted line position to its full line position to change the connection of the field circuit from one end of the field resistance 27 to the other, and the armature is connected to the mains which give the third voltage. The forward movement of the controller may be continued until the highest voltage is reached, the field resistance being cut in by the arm 22 while the armature remains connected to each set of mains and being cut out by the switch 26 as the armature is changed from one set of mains to another.

It is not necessary that the multiple voltage controller be of the drum type, nor is it necessary for the rheostat arm to be operated by a cam. Indeed, there are many other uses of the rheostatic controller scheme shown here. The multiple voltage controller being shown in connection with it merely to illustrate one of its uses.

Many other modifications may be made in the precise arrangement of the controller here shown and described, and all such which come within the spirit and scope of my invention I aim to cover in the following claims.

What I claim as new is:

1. In a rheostat, a resistance, a plurality of contacts connected to said resistance, an arm movable over said contacts, and means for reversing the connection of the resistance to the line when the arm passes certain points in its movement.

2. In a rheostat, a resistance, a plurality of contacts connected to said resistance, an arm movable over said contacts, and means for changing a connection of the line from one end of the resistance to the other when the arm is moved into either extreme position.

3. In a rheostat, a resistance, a plurality of contacts connected to points on said resistance, an arm movable over said contacts, and a double throw switch arranged to be thrown from one position to the other when said arm is moved to either extreme position, said switch when in its two positions connecting the two ends of the resistance to the circuit respectively.

4. In a multiple voltage controller, means for connecting a motor armature to different sets of mains of a multiple voltage system, a rheostat arranged to cut resistance into the motor field circuit while the motor armature connections remain unchanged, and a switch for changing the connection of the field circuit from one end of the resistance of said rheostat to the other when the armature connections are changed.

5. In a rheostat, an arm arranged to be moved in one direction to vary the resistance in a circuit, and means for changing the connections so that the same resistance variation may be obtained by movement of the arm in the other direction.

6. In a rheostat, a series of resistance contacts, an arm movable over said contacts, and means for changing the connection of said contacts so that the arm may be moved in either direction to effect the same results.

Milwaukee, Wis., Sept. 9, 1909.

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

HERBERT W. CHENEY.

Witnesses:

CHAS. L. BYRON,

ROB. E. STALL.