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CARBON FILE RHEOSTAT

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3 Sheets-Sheet 3

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This invention relates to carbon-pile rheostats or controllers and more particularly to a modified form of mechanism for compressing the carbon pile.

Fig. 10 is a longitudinal sectional view taken substantially along the line 10—10 of Fig. 9. Fig. 11 is a transverse sectional view taken substantially along the line 11—11 of Fig. 9.

In the embodiment of this invention shown in Figs. 1 to 8, inclusive, the improved controller comprises a hollow casing formed by a rectangularly shaped and substantially flat base 10, and a rectangularly shaped top or cover 11, each being preferably moulded in one piece from phenolic condensation material or artificial resin. The parts 10 and 11 are detachably secured together by means of corner screws 13 which are screwed in corner lugs 14 formed on the top 11. The screws 13 also function to hold the rubber feet 15 in position on the corners of the base 10.

Carried by the base 10 is a substantially rectangularly shaped sheet-metal member, indicated generally as 16 (Figs. 1 and 7), formed in one piece and having a tubular longitudinal central portion 17 which embraces and supports a single carbon disk pile 18. The sheet metal member 16 also has oppositely directed legs or heat dissipating fin portions 19 and 20 which are secured to the base 10 by the screws 21. This member 16 is coated with a dielectric porcelain enamel so as to electrically insulate the carbon pile from its support. The advantage of the above described support for the carbon-pile is that the sheet metal member 16 rapidly conducts heat generated in the carbon pile away from the pile and spreads it over a large area thus preventing concentration of the heat in the pile.

Formed on the insulating base 10 is an upwards lug 23 having a groove 24 (Figs. 1 and 2) formed in its upper face. A T-shaped compression plunger 26 is slidably fitted in the groove 24 and extends through a cap 25 at one end of the pile. The enlarged end 27 of the plunger 25 is located within the cylindrical portion 17 of the sheet metal member 16 and in contact with the carbon pile 18.

At the other end of the pile, the base 10 is formed with two spaced upwards lugs 28 each of which is provided with a vertical slot 29 (Figs. 1 and 4) thereby providing confining shoulders for a nut 30. Threaded in the nut is a screw 31 having one of its ends extending through the cap 32 and into engagement with the carbon pile. The other end of the screw 31 is formed with a screw driver slot so that it may be adjusted longitudinally of the pile for the purpose of varying the initial pressure on the pile.

Located at one side of and parallel to the car-
bon pile 18 is a resilient copper conductor strip 33 which is secured to the base 10 by means of a screw 34 (Figs. 3 and 6). A flexible electrical conductor 35 is electrically connected to the strip 33. This strip 33 is a laterally extending portion 32 (Figs. 1 and 6) which is electrically connected to the adjustable screw 31. On the opposite side of the carbon pile, a resilient copper conducting strip 37 is secured to the base 10 by a screw 38 and is electrically connected to a flexible electrical conductor 39.

The tops of the lugs 28 are slotted to receive a pivot-pin 40 formed with a reduced portion near each end. In order to provide means for varying the pressure on the carbon pile there is provided a U-shaped spring or resilient metal member having limbs 42, 42', the free ends of which are bent back upon themselves to encircle and embrace the reduced portions of the pivot pin 40 anchored in the slots formed in the tops of the lugs 28. The connecting portion 43 of the U-shaped member lies in a notch 44 formed in the end movable piece 41.

For the purpose of bending or flexing the U-shaped spring centrally of its length to cause it to act as a toggle joint and apply pressure on the carbon pile 18 there is slidable mounted in the cover or top 11 a manually operable push button or pedal 45. The pedal 45 has two depending guides 46 which are slidable received in the guide-ways 47 formed in the top 11, and two depending lugs 48 which straddle the carbon pile and rest upon the limbs 42, 42' of the U-shaped actuating spring.

In the operation of the above described motor controller or rheostat, when the pedal 45 is depressed by the operator the downward movement of the pedal causes the lugs 48 to flex the limbs 42, 42' of the U-shaped spring downwardly and the initial downward movement of the limb 42' causes the limb 42' to engage the resilient conducting strip 37 and the circuit is thereby closed through the carbon pile resistor 18.

The circuit at this time is as follows: From the lead 39 through the conductor strip 37 and U-shaped metal spring to the metal plunger 26, through the plunger 26 and carbon pile 18 to the switch 20, the laterally extending portion 33 of the strip 33 to the lead 35.

It will be observed that further downward movement of the pedal 45 causes further flexing of the limbs 42, 42' of the U-shaped spring and as one end of the spring is anchored by the pivot pin 50 the plunger 26 is forced against the carbon pile thereby compressing it. It will be understood that the limbs 42, 42' are, in effect, toggle joints which allow the operating button or pedal 45 to be actuated over a wide range at a constant pressure to thereby vary the resistance of the carbon pile at a uniform ratio.

Continued downward movement of the pedal 45 causes the limbs 42, 42' to be further flexed there- by gradually increasing the pressure exerted on the carbon pile until the pressure is at a maximum and the electrical resistance offered by the pile is at its minimum. At this point the limb 42 engages the spring conductor strip 33 which lies relatively close to the base 10, as shown in dotted lines in Fig. 2. When the limb 42 engages the strip 33 the carbon pile is shorted out of the circuit, the circuit then being as follows: From lead 39 through conductor strip 37, the U-shaped spring actuator, conductor strip 33 to the other lead 35.

In the modification of the invention shown in Figs. 9 to 11, inclusive, the rheostat is not actuated by a foot pedal but is adapted to be mounted on the sewing machine or similar cabinet in a substantially vertical position and operated by a pull rod and springs. The pull rod and springs 49 are attached to the terminal post 51 and its other end connected to the controller. In this modification, the casing comprises a base A and removable cover B forming a housing for a carbon pile compression unit which is identical with that shown in the preceding figures. The difference in the two constructions lies in the substitution for the push-pedal 45 of a pull-block 50 slidably mounted in suitable guide-ways formed in the casing. The pull block 50 is molded from phenolic thermosetting material with a metal insert pull plate 51 which is adapted to be connected to a pull rod. Connected to the pull block 50 by the nut and bolt 52, 53. (Fig. 10) are two L-shaped arms 54 which have their free ends pivoted at 55 to the depending limbs of bell-crank levers 56 located on opposite sides of the carbon pile 18 and pivoted at 56 to the upstanding arms 57 of a U-shaped bracket 58 formed to the base A by the screws 59. Springs 60 each having one of their ends connected to the L-shaped arms 54 and their other end connected to an upstanding lug 61 formed on the bracket 58 serve to yieldingly maintain the above described parts in the position shown. Pivoted to the other arm of the bell-crank lever 62 at 63 is a member 66 which connects the arms of the bell-crank levers and extends over the carbon pile 18.

The member 66 is formed with shoes 65 which centrally engage the limbs 42 and 42' of the U-shaped spring.

From the above it will be understood that when the pull-block 50 is moved to the left as viewed in Figs. 9 and 10 the arms 54 will swing the bell-crank lever 62 about its pivot 56 thereby causing the shoes 65 to flex the limbs 42, 42' of the U-shaped spring in the same manner and for the same purpose as the lugs 48 of the pedal member 48 when the latter is depressed.

Having thus set forth the nature of the invention, what I claim herein is:

1. A controller for electric motors comprising a base, a carbon pile resistor carried by said base, the latterly extending portion 33 of the strip 33 to the lead 35. It will be observed that further downward movement of the pedal 45 causes the limbs 42, 42' of the U-shaped spring and as one end of the spring is anchored by the pivot pin 50 the plunger 26 is forced against the carbon pile thereby compressing it. It will be understood that the limbs 42, 42' are, in effect, toggle joints which allow the operating button or pedal 45 to be actuated over a wide range at a constant pressure to thereby vary the resistance of the carbon pile at a uniform ratio.

Continued downward movement of the pedal 45 causes the limbs 42, 42' to be further flexed there- by gradually increasing the pressure exerted on the carbon pile until the pressure is at a maximum and the electrical resistance offered by the pile is at its minimum. At this point the limb 42 engages the spring conductor strip 33 which lies relatively close to the base 10, as shown in dotted lines in Fig. 2. When the limb 42 engages the strip 33 the carbon pile is shorted out of the circuit, the circuit then being as follows: From lead 39 through conductor strip 37, the U-shaped spring actuator, conductor strip 33 to the other lead 35.

In the modification of the invention shown in
neath each limb and arranged so that when the limbs are initially flexed one of said strips is engaged by one of the limbs to connect the carbon pile in series in the circuit and when the limbs are completely flexed the other strip is engaged to short circuit the carbon pile.

4. A controller for electric motors comprising a base, a sheet metal carbon pile support coated with electrical insulating material secured to said base, said support being formed with a longitudinal tubular portion and oppositely directed heat dissipating fins extending laterally from said tubular portion, a carbon pile carried by the tubular portion of said support, a plunger extending into said tubular portion and in contact with one end of said carbon pile, a U-shaped spring having its limbs located on opposite sides of said carbon pile and its connecting portion operatively connected to said compression plunger, means for anchoring the free ends of the limbs of said U-shaped spring to said support at points adjacent the other end of said carbon pile, and manually operable means for simultaneously flexing both limbs of said U-shaped spring to shift said plunger relative to said carbon pile for the purpose of applying pressure on said carbon pile.

7. In a controller for electric motors having a support and a resistor secured to said support, the improvement which consists in varying the pressure upon said resistor over a wide range by means of a spring having limbs located on opposite sides of said resistor and arranged substantially parallel thereto, one end of each of said limbs being anchored adjacent one end of said resistor and the other end of the limbs being connected to apply pressure to the other end of the resistor, and manually operable mechanism for flexing said limbs simultaneously at points intermediate their ends to produce a toggle action and thereby vary the resistance of the carbon pile at a substantially uniform ratio.

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