July 16, 1946. R. F. MALLINA 2,403,989

POTENTIOMETER DEVICE

Filed May 30, 1944 2 Sheets-Sheet 1

FIG. 1

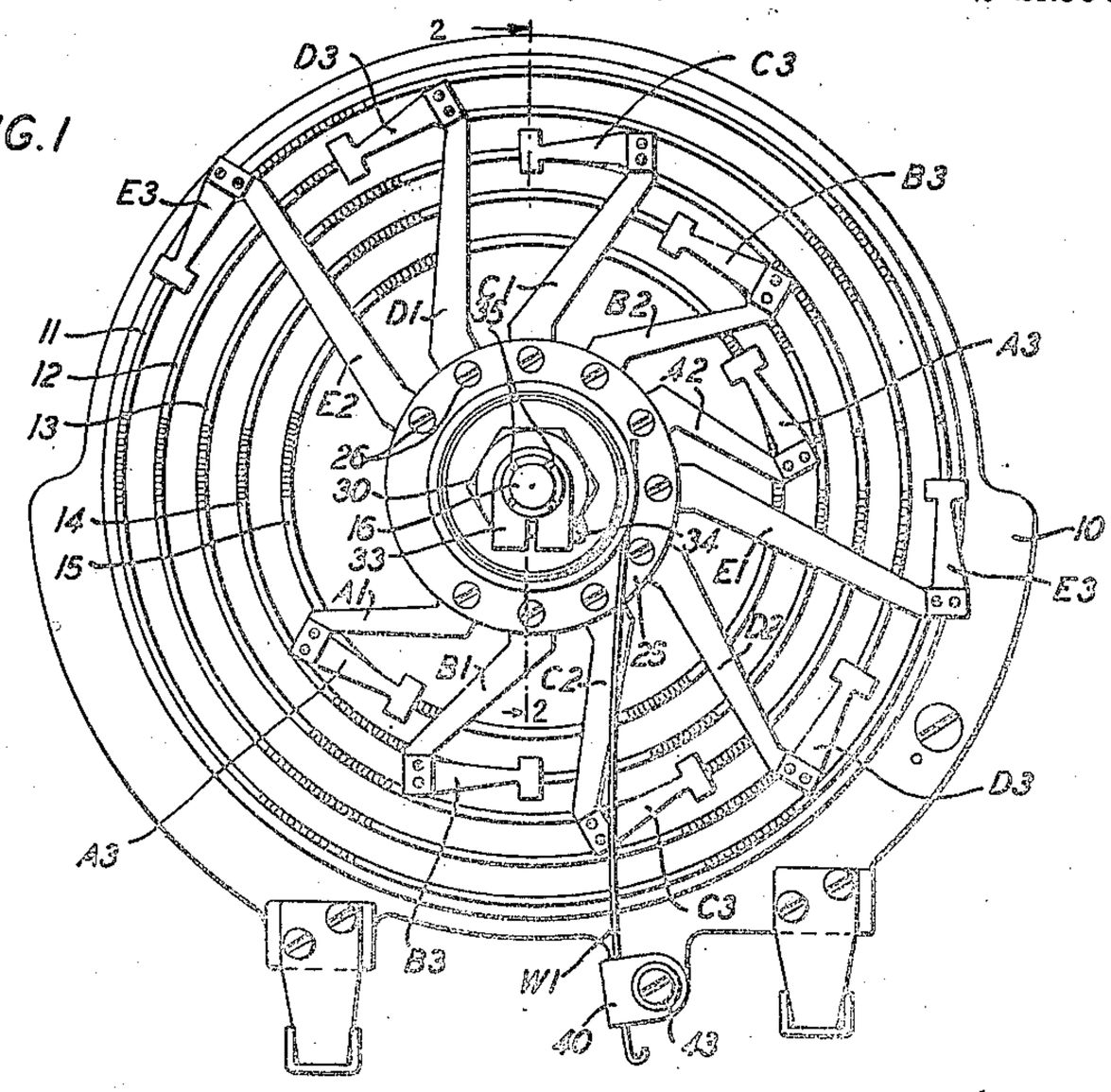

FIG. 6

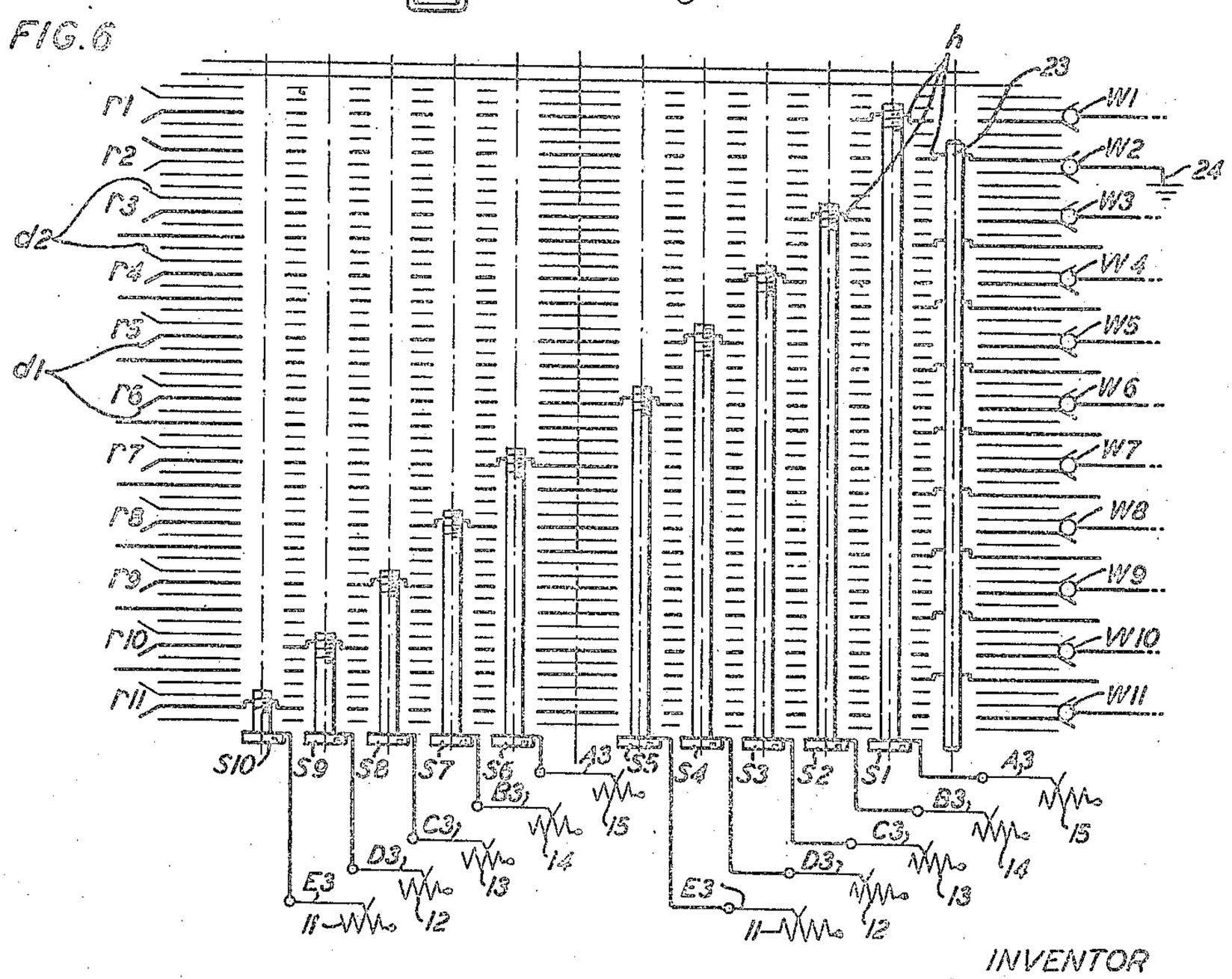

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FIG. 2

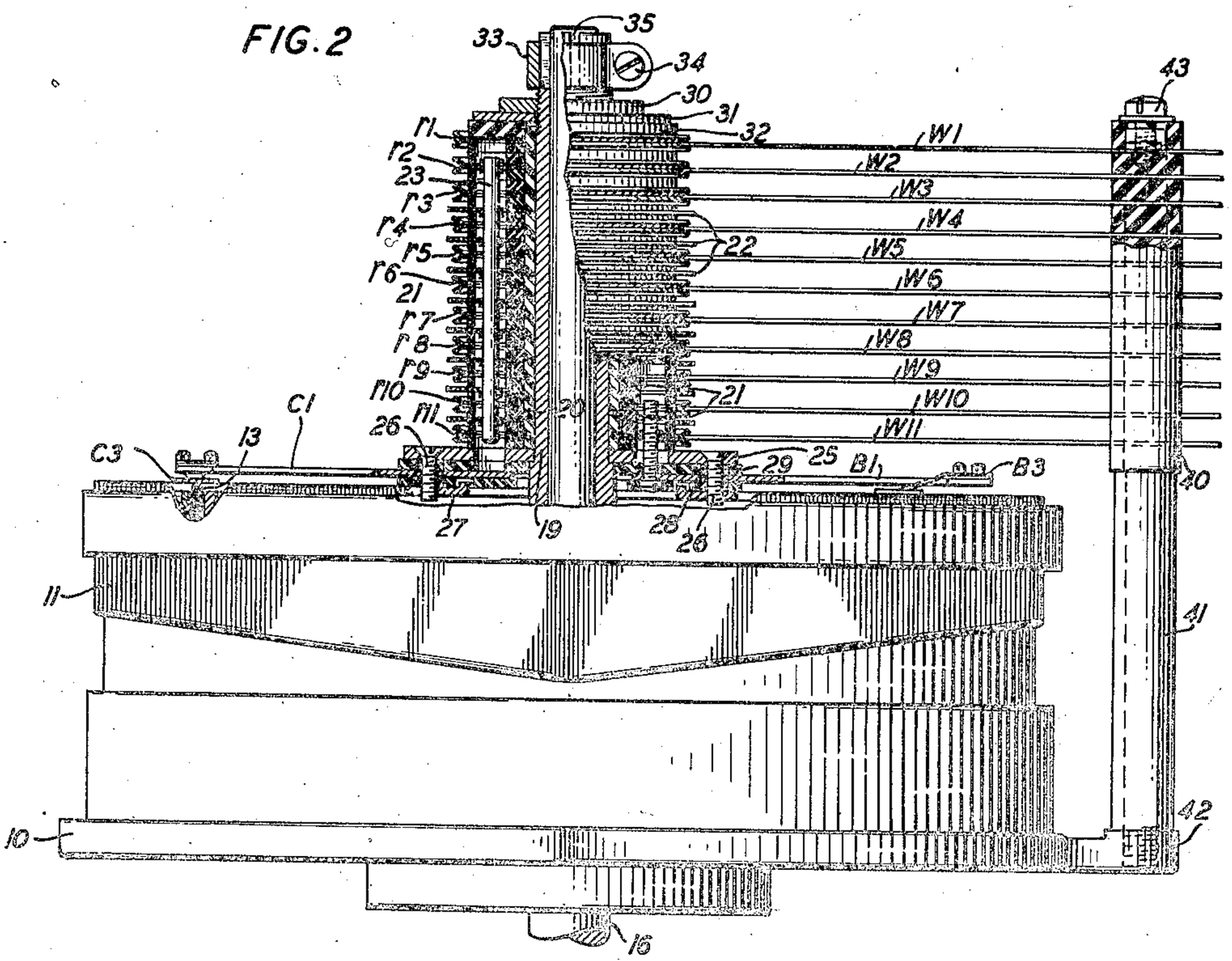


FIG. 3

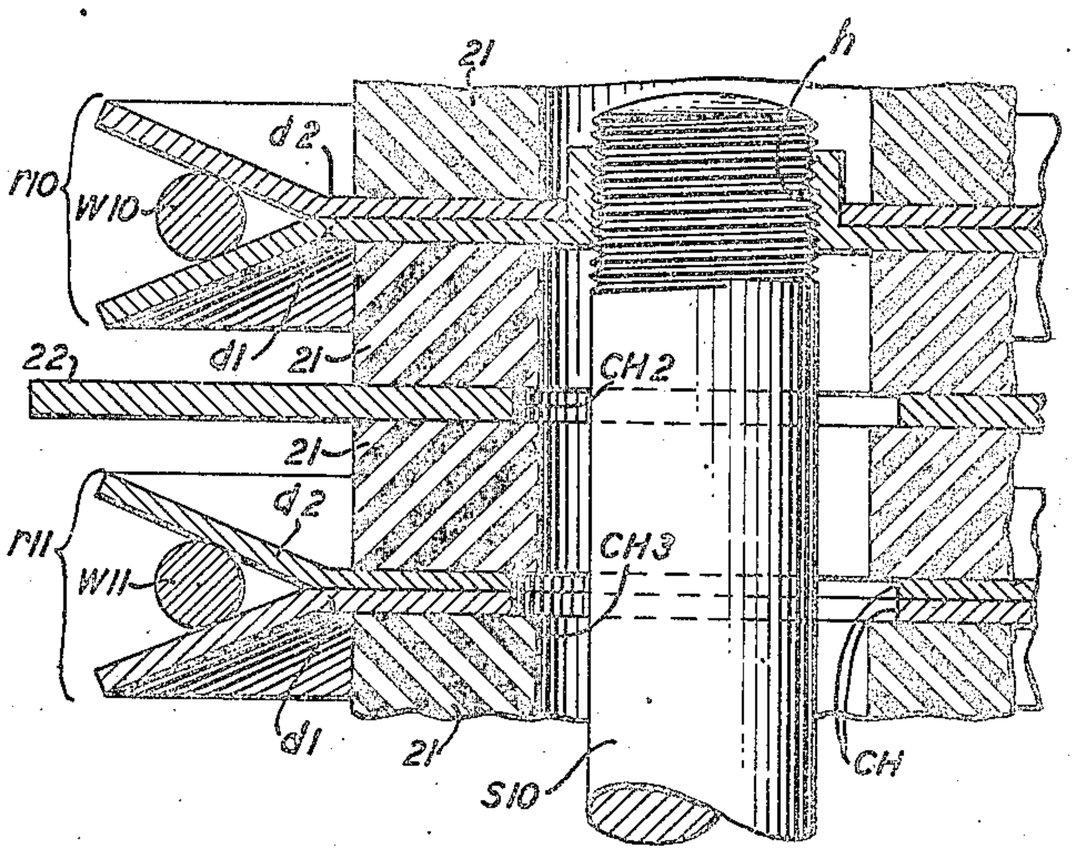


FIG. 4

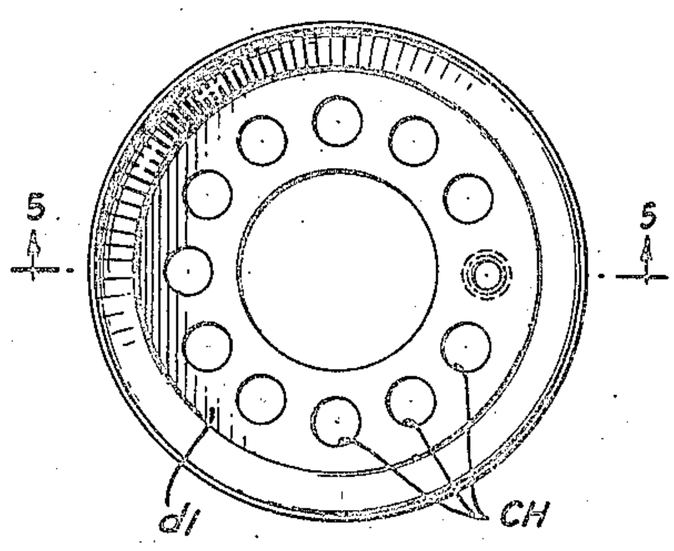
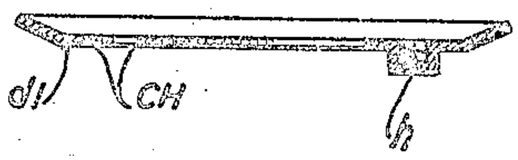


FIG. 5



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Patented July 16, 1946

2,403,989

UNITED STATES PATENT OFFICE

2,403,989

POTENTIOMETER DEVICE

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Application May 30, 1944, Serial No. 538,084

6 Claims. (Cl. 201—55)

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This invention relates to potentiometer devices.

The object of this invention is the provision of a potentiometer which will be cheap to manufacture and in which electrical connections between the different operative parts of the device are effected in a simple and positive manner.

In the drawings,

Fig. 1 is a top assembly view;

Fig. 2 is an elevation view shown partly in vertical section taken on line 2—2 of Fig. 1;

Fig. 3 is a partial view in vertical section showing two slip rings and connecting wire brushes enlarged with one of the slip rings connecting with its connecting screws;

Fig. 4 is a top view of one of the discs used in the construction slip rings.

Fig. 5 is a cross-sectional view of the disc shown in Fig. 4 taken in line 5—5 of that figure; and,

Fig. 6 is a diagrammatic view showing the electrical connections between the different cooperative conducting elements of the potentiometer.

In the potentiometer of this invention, a base in the form of a substantially circular casting 10 shown in Figs. 1 and 2 is provided for mounting a plurality of stationary concentrically disposed coils 11, 12, 13, 14 and 15 and a rotatable shaft 16. On this shaft are mounted in superposed relation to each other a plurality of slip rings *r*1, *r*2, *r*3, *r*4, *r*5, *r*6, *r*7, *r*8, *r*9, *r*10 and *r*11, each of which consists of two dish-shaped discs *d*1 and *d*2 best seen in Figs. 3, 4 and 5 and diagrammatically in Fig. 6. These discs when assembled in pairs form peripheral V-shaped grooves for engagement with conducting brushes in the form of resilient wires *w*1, *w*2, *w*3, *w*4, *w*5, *w*6, *w*7, *w*8, *w*9, *w*10 and *w*11 respectively, thus forming a two-point contact with these discs.

The slip rings *r*1, *r*2, *r*3, etc., thus formed are insulated from a metallic sleeve 19 fitted on shaft 16 by a sleeve 20 of any suitable insulating material and the slip rings are positioned in spaced relation to each other by similar insulating rings 21 also serving for insulating shields in the form of metallic discs 22 from the slip rings *r*1, *r*2, *r*3, etc.

The shields 22 are electrically connected to each other and to slip rings *r*2, by a rod 23 shown in Figs. 2 and 6 engaging holes drilled in the shield and in one of the discs forming the slip rings *r*2 with a press fit adjustment, the slip ring *r*2 being engaged by the wire brush

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*w*2 as shown in Figs. 2 and 6, the wire brush being connected to a ground terminal 24.

On metallic sleeve 19 is mounted a disc 25 serving for securing a plurality of pairs of arms as A1—A2, B1—B2, C1—C2, D1—D2 and E1—E2 on the free ends of which are mounted the pairs of wipers A3, B3, C3, D3 and E3, respectively, each pair of wipers collectively engaging the resistance coils in the following order: wipers A3 engaging the coil 15, wipers B3 engaging the coil 14, wipers C3 engaging the coil 13, wipers D3 engaging the coil 12 and wipers E3 engaging the coil 11. The arms A1—A2, B1—B2, C1—C2, etc., are insulatively secured to the disc 25 by the clamping action of a plurality of similar screws 26 engaging similarly screw-threaded holes in a ring 27, insulated from the arms A1—A2, B1—B2, C1—C2, etc., by a ring 28 and a sleeve 29.

Electrical connections from the pairs of wipers A3, B3, C3, etc., and their supporting arms A1—A2, B1—B2, C1—C2, etc., with their respective wire brushes *w*1, *w*2, *w*3, *w*4, *w*5, etc., are effected by screws *s*1, *s*2, *s*3, *s*4, *s*5, *s*6, *s*7, *s*8, *s*9 and *s*10 of different lengths extending through clearance holes such as CH in the superposed slip rings *r*11, *r*10, *r*9, etc., in clearance holes such as CH2 in the shield 22 and in clearance holes such as CH3 in the insulating spacer rings 21, in engagement with the screw-threaded holes as *h* in the discs *d*1 of their respectively associated slip rings in the following order: screw *s*1 as shown in Fig. 6 connecting with the slip ring *r*1, screw *s*2 with slip ring *r*3, screw *s*3 with slip ring *r*4, screw *s*4 with slip ring *r*5, screw *s*5 with slip ring *r*6, screw *s*6 with slip ring *r*7, screw *s*7 with slip ring *r*8, screw *s*8 with slip ring *r*9, screw *s*9 with slip ring *r*10 and screw *s*10 with slip ring *r*11. The slip rings, the insulating rings 21 and the shield 22 are held collectively in assembled relation with the disc 25 and insulating sleeve 20 by the clamping action of a nut 30 bearing against a metallic washer 31 and an insulating washer 32, the latter bearing against the slip ring *r*1. The metallic sleeve 19 is secured to the shaft 16 by a clamping ring 33 engaging the screw-threaded portion of the sleeve 19 which is slotted longitudinally as at 35 forming prongs forced against the shaft 16 by the tightening of a screw 34.

The wire brushes *w*1, *w*2, *w*3, *w*4, etc., are molded in a bank 40 of insulating material fitted on a stud 41 laterally extending from and threadedly engaging a projection 42 formed with the base 10, the bank 40 being held securely

on the stud 41 by the tightening effect of a screw 43 following the proper tensioning of wire brushes *w*1, *w*2, *w*3, etc., on their respectively associated slip rings *r*1, *r*2, *r*3, etc., while the contact pressure of wipers A3, B3, C3, etc., is conveniently effected by the simple twisting or bending their supporting arms A1—A2, B1—B2, etc.

What is claimed is:

1. In a potentiometer, a mounting, a plurality of resistance coils secured to said mounting, a pair of wipers for each of said resistance coils frictionally engaging the latter, means for moving said pairs of wipers on said resistance coils collectively, a contact for each of said wipers, means electrically connecting said wipers to said contacts respectively, and stationary brushes frictionally engaging said contacts.

2. In a potentiometer, a mounting, a plurality of circular resistance coils secured to said mounting, a shaft journaled in said mounting positioned concentric to said resistances, a plurality of arms mounted on said shaft, wiper elements carried by said arms engaging said resistances, a plurality of slip rings mounted on said shaft, means electrically connecting said wipers to said slip rings individually, and a stationary brush associated with each of said slip rings.

3. In a potentiometer, a plurality of resistance coils arranged in concentric relation to each other, a pair of wipers for engaging each of said coils, a rotatable shaft for moving said wipers collectively on said coils, a plurality of slip rings mounted in superposed relation on said shaft, one of said slip rings for each of said wipers, and means electrically connecting each of said wipers to each of said slip rings in said superposed relation.

4. In a potentiometer, a plurality of resistance coils arranged in concentric relation to each other, a pair of wipers for engaging each of said coils, a rotatable shaft for moving said wipers collectively on said coil, a slip ring for each of said wipers, each of said slip rings having a contact surface of V-shaped cross-section, and a brush of circular cross-section engaging said groove for contact at two points in said groove.

5. In a potentiometer, a plurality of concentrically disposed resistance coils, a rotatable shaft disposed concentric to said coils, a plurality of wiper members carried by said shaft for engaging said coils, slip rings and shield discs mounted in a pile-up arrangement on said shaft, insulating means serving as spacer members between said slip rings and said shield discs, means electrically connected to said shield discs collectively to one of said slip rings and a plurality of other means electrically connecting each of said wipers to each of the other of said slip rings in said pile-up.

6. In a potentiometer, a plurality of concentrically disposed resistance coils, a rotatable shaft disposed concentric to said coils, a metallic sleeve mounted on said shaft, a disc carried by said sleeve, a plurality of wipers insulatedly mounted on said disc, an insulating sleeve fitted on said metallic sleeve concentric thereto, a plurality of slip rings and shield discs insulated from each other and fitted over said insulating sleeve in a pile-up arrangement, means for securing said pile-up to said metallic sleeve and means for securing said metallic sleeve to said shaft.

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